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Kohutko

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(54) **SUCTION HEAD FOR SEDIMENT DREDGE**

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E02F 3/00 (2006.01)

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(58) **Field of Classification Search** 37/341, 37/318, 314, 316, 317, 319, 335
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

216,061 A * 6/1879 Shaw 37/318
307,326 A * 10/1884 Pattison 15/1.7
371,686 A * 10/1887 Howell 37/333
1,101,541 A * 6/1914 Harrington 15/1.7
1,508,521 A * 9/1924 Kreuser 37/318
1,964,951 A * 7/1934 Kertzman 37/318
2,023,686 A * 12/1935 Kertzman 37/318
2,081,597 A * 5/1937 Nowak 15/1.7
2,643,471 A * 6/1953 Ragsdale 37/324
3,287,755 A * 11/1966 Pansini 15/1.7
4,113,616 A 9/1978 Kaes
4,178,704 A * 12/1979 Latimer et al. 37/318
4,318,233 A * 3/1982 Romain 37/318
4,347,675 A 9/1982 Latimer
4,352,251 A * 10/1982 Sloan 37/323
4,765,071 A * 8/1988 Maitlen 37/325
4,819,346 A * 4/1989 Maitlen 37/325
4,957,622 A * 9/1990 Mims 210/170.04
5,651,200 A * 7/1997 Walsh et al. 37/329
6,083,063 A * 7/2000 Neisen 440/46
6,283,805 B1 * 9/2001 Ishigaki 440/46
6,482,055 B1 * 11/2002 Freitag 440/46
2004/0010867 A1 1/2004 Habit et al.

* cited by examiner

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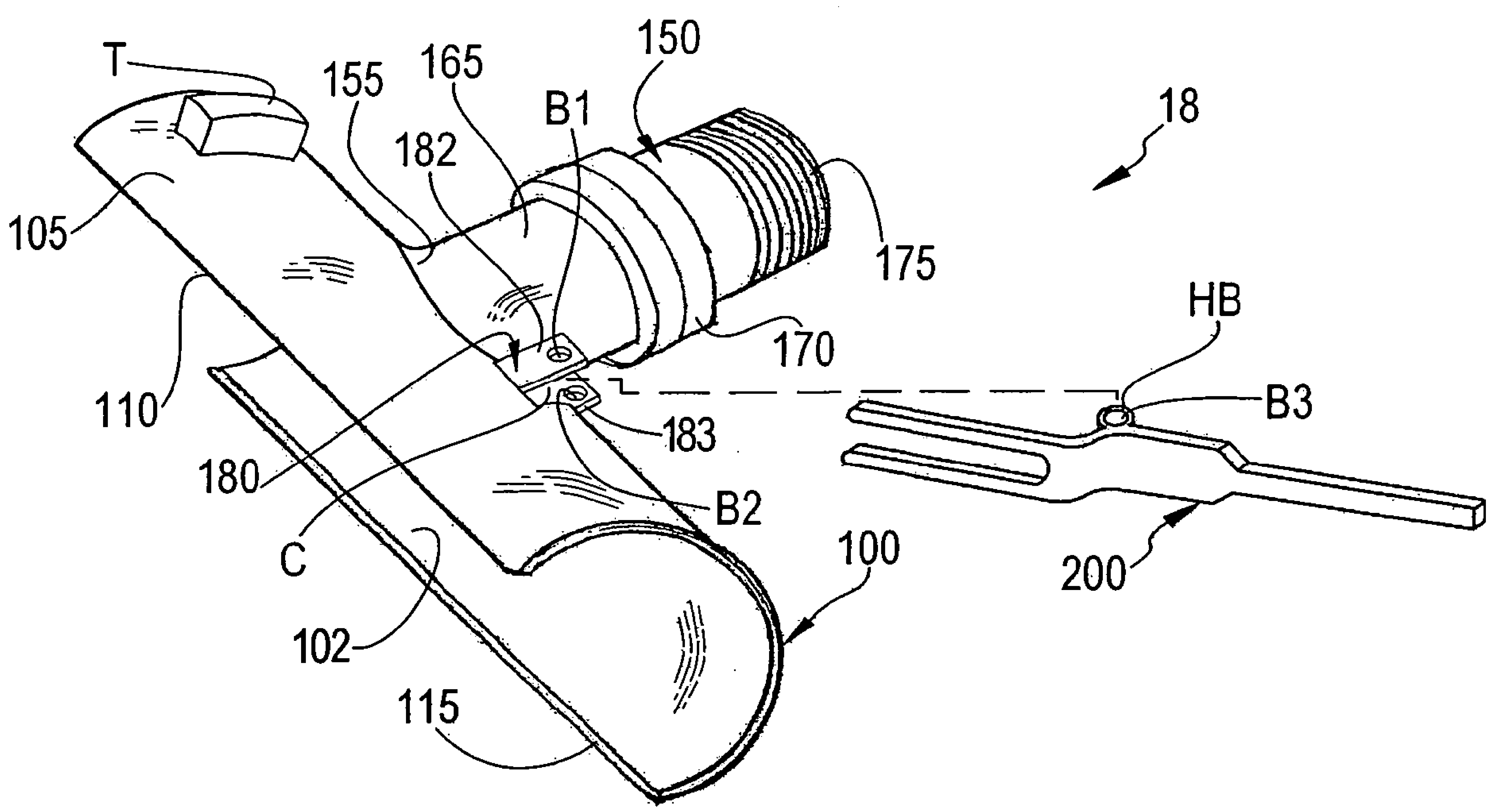
(57) **ABSTRACT**

Dredge heads, for use with a dredging system, include one or more movable members, e.g. grate members, adapted and configured to selectively extend across the opening of the dredge head. The movable member(s) enables a user to clear the dredge head of plugging masses or blockages without having to de-energize the dredge system pump. Also, the movable member(s) enable a user to clear the dredge head of plugging masses or blockages without requiring the user to manually, by using his or her hand, withdraw the plugging masses or blockages from the opening of the suction/dredge heads.

27 Claims, 5 Drawing Sheets



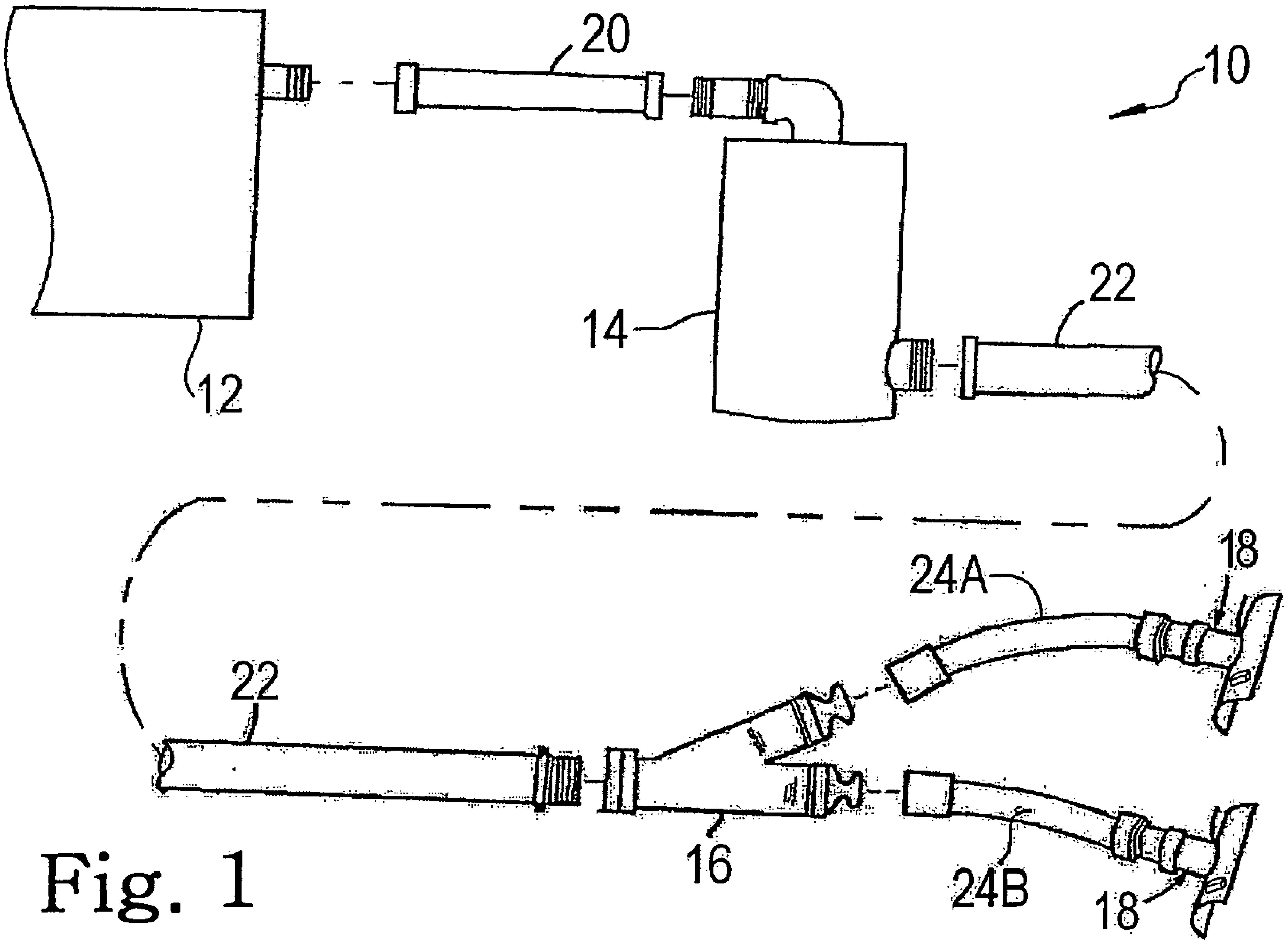
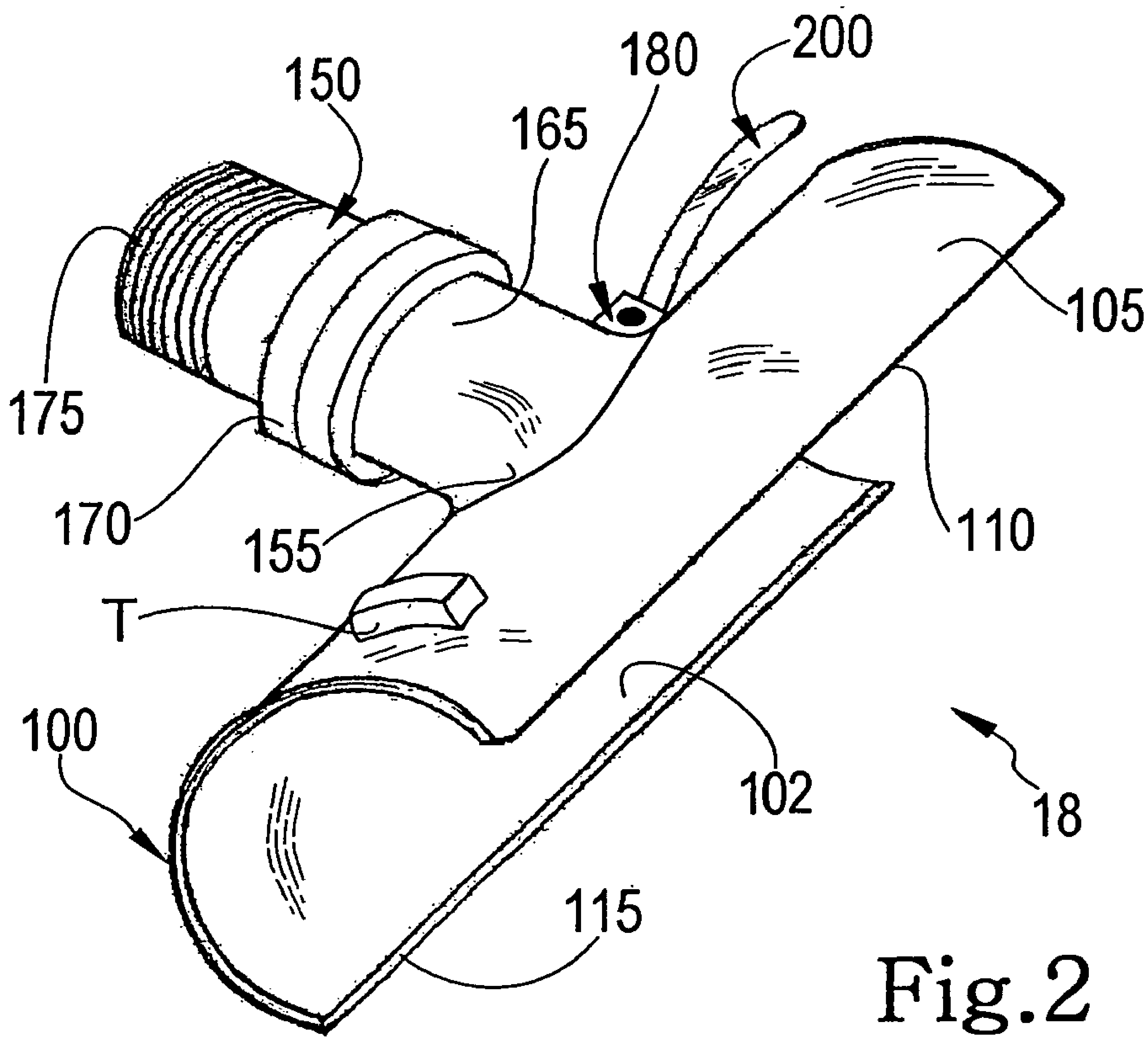

20
10
12
14
22
24A
18
22
16
24B
18

Fig. 1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180
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165
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175
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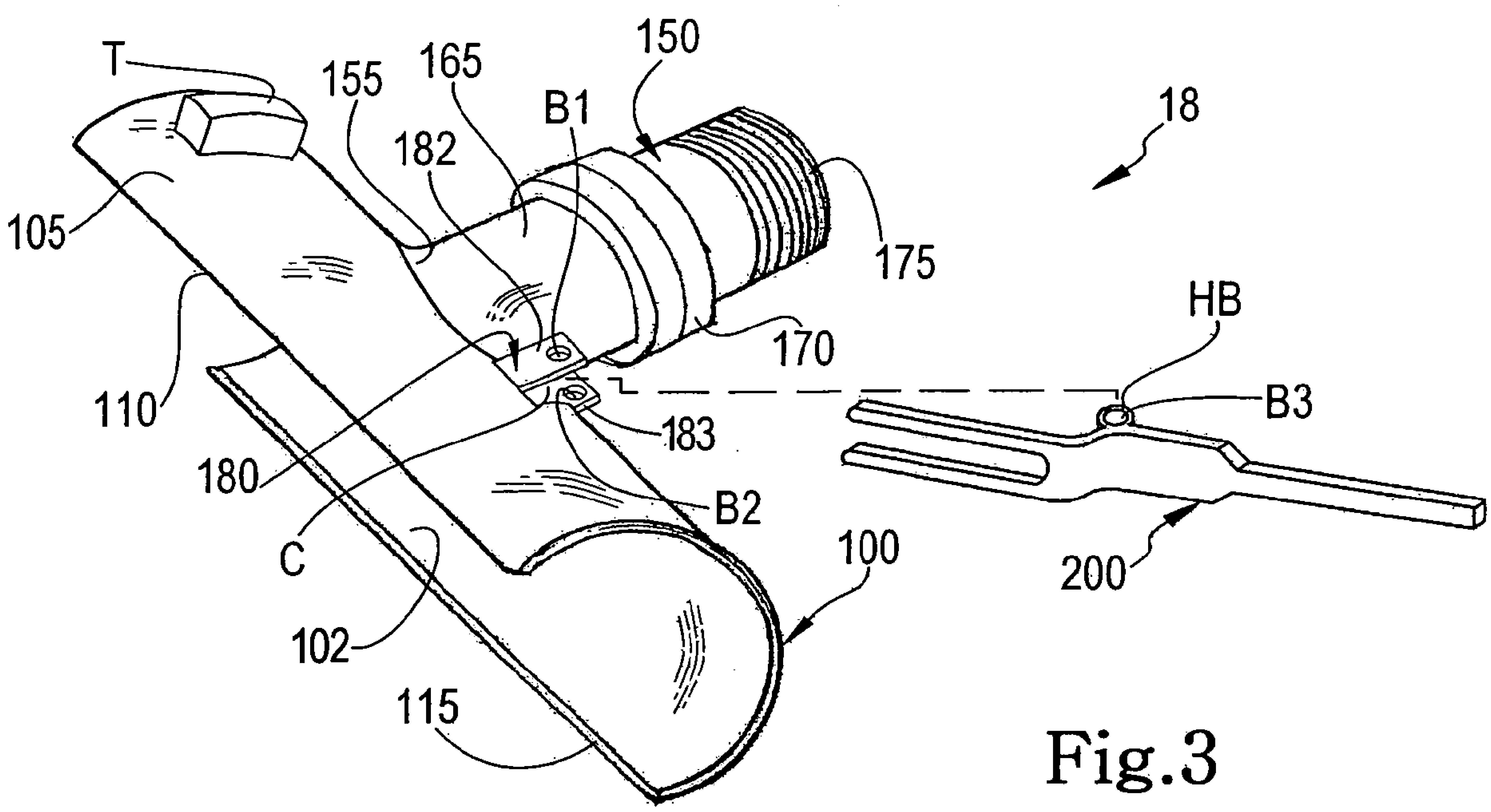
155
110
T
100
102
18
115

Fig.2


T
155
165
150
18
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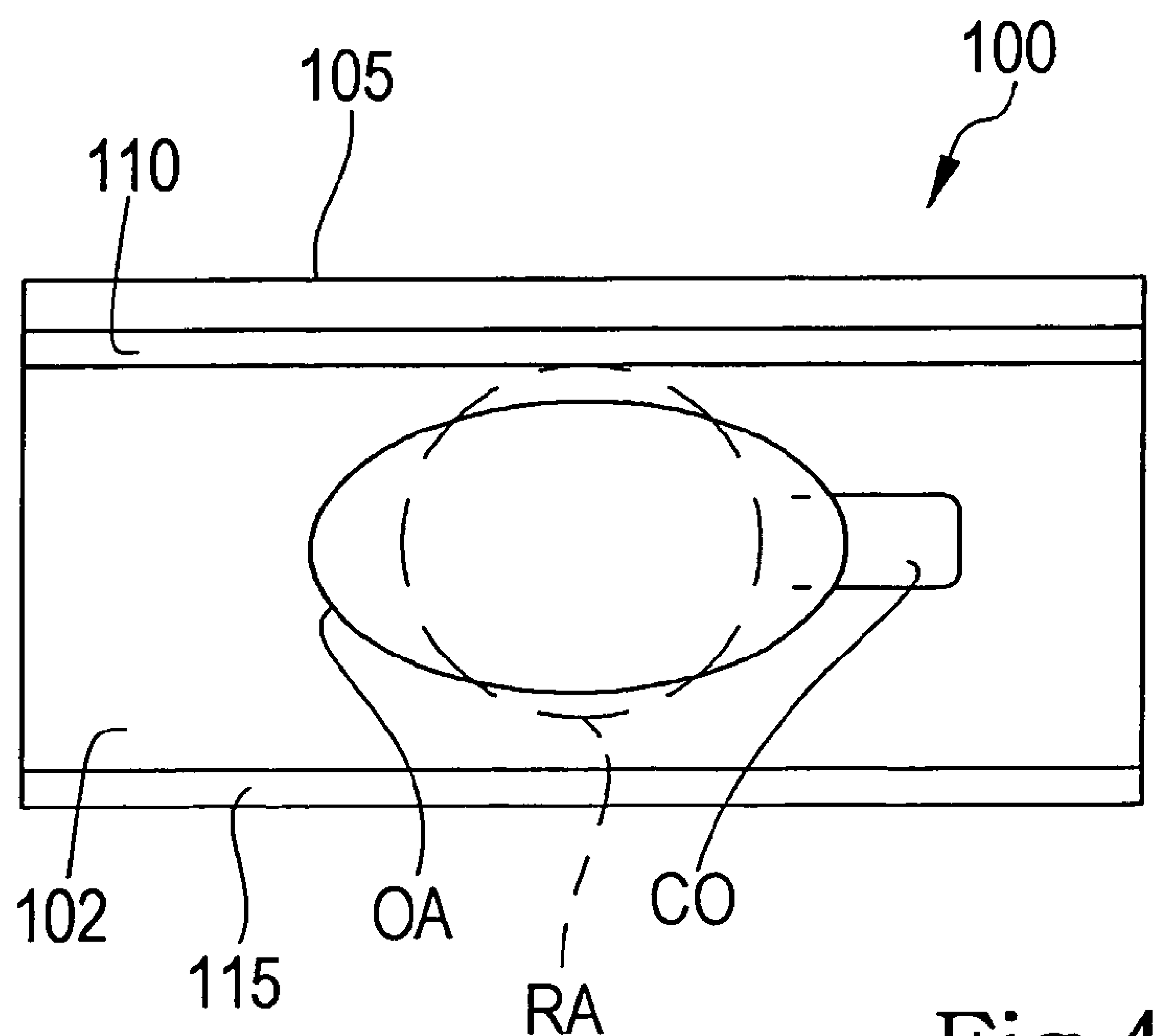
HB
170
B3
110
183
180
B2
C
100
200
102
115

Fig.3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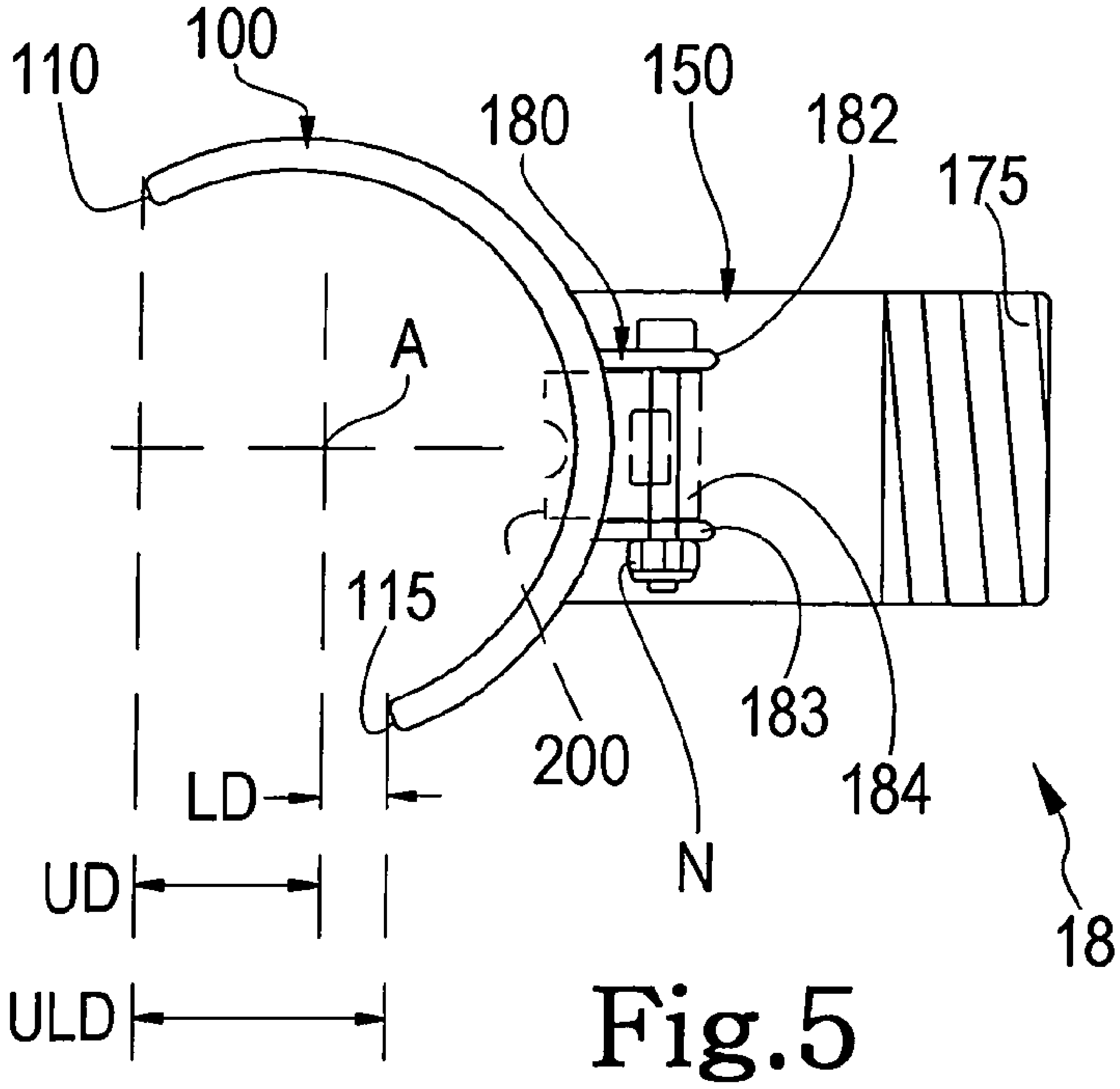
110
102
115
OA
RA
CO

Fig.4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A
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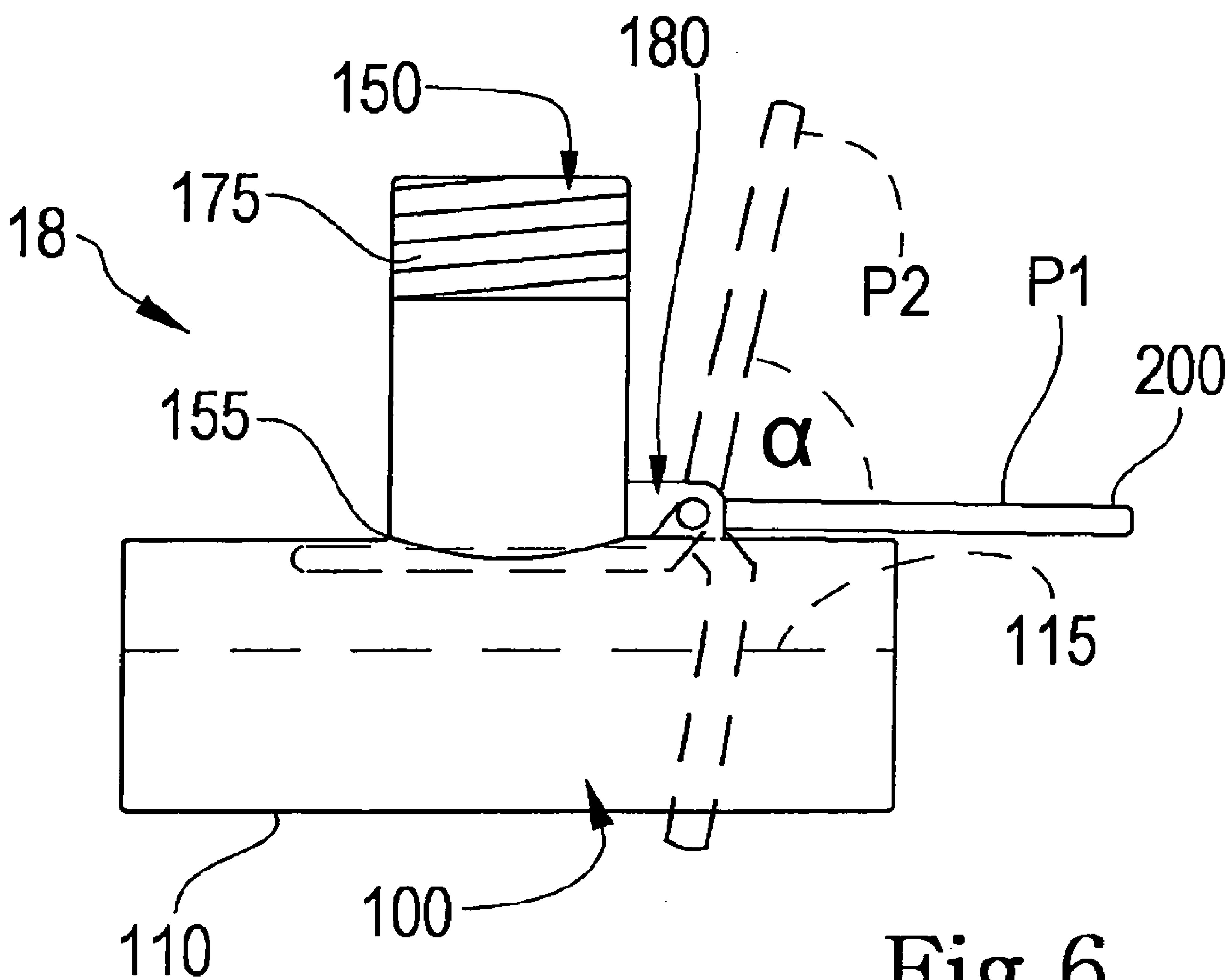
183
184
LD
N
UD
18
ULD

Fig.5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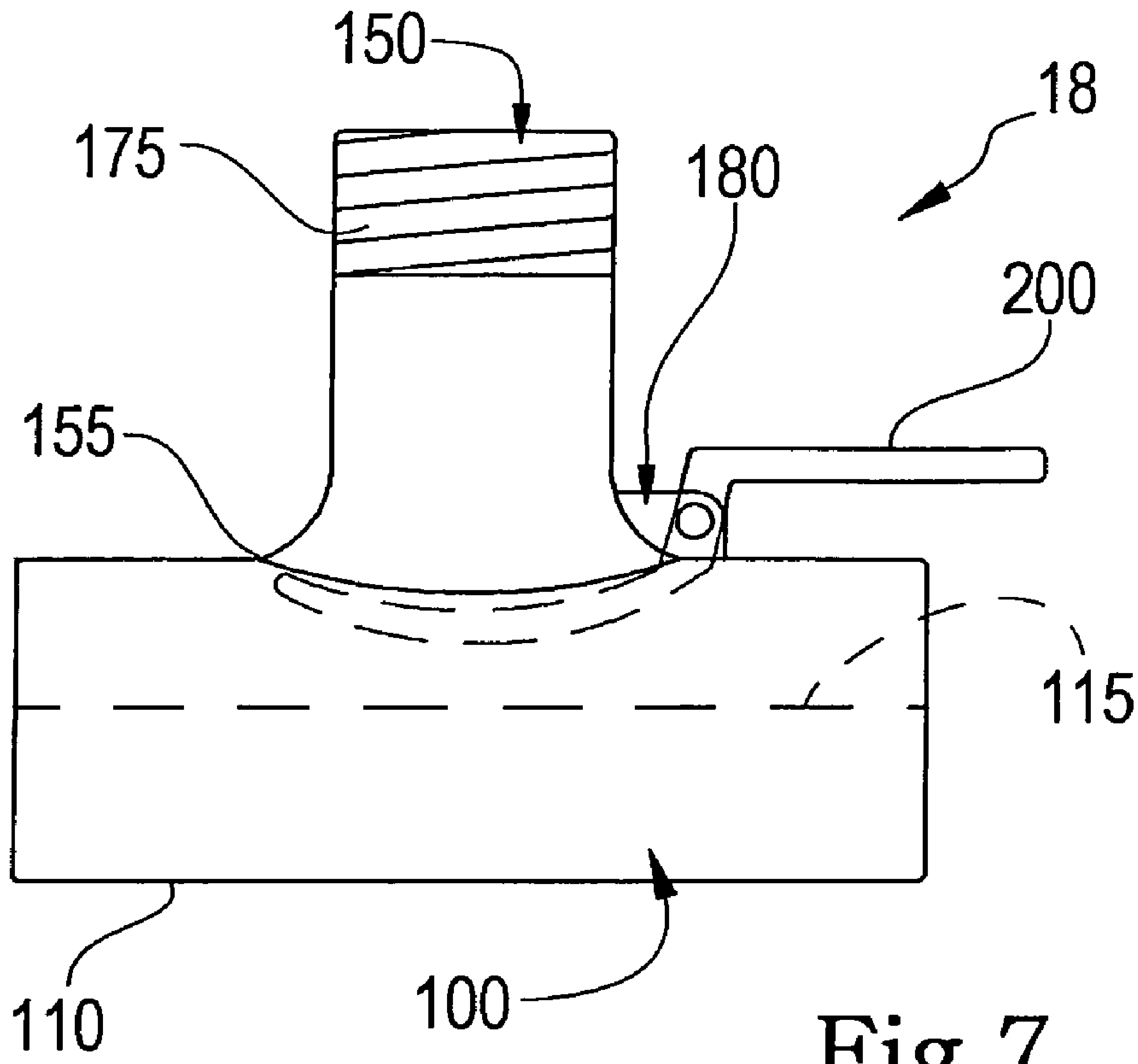
175
18
P2
P1
200
155
α
115
110
100

Fig.6


150
175
18
180
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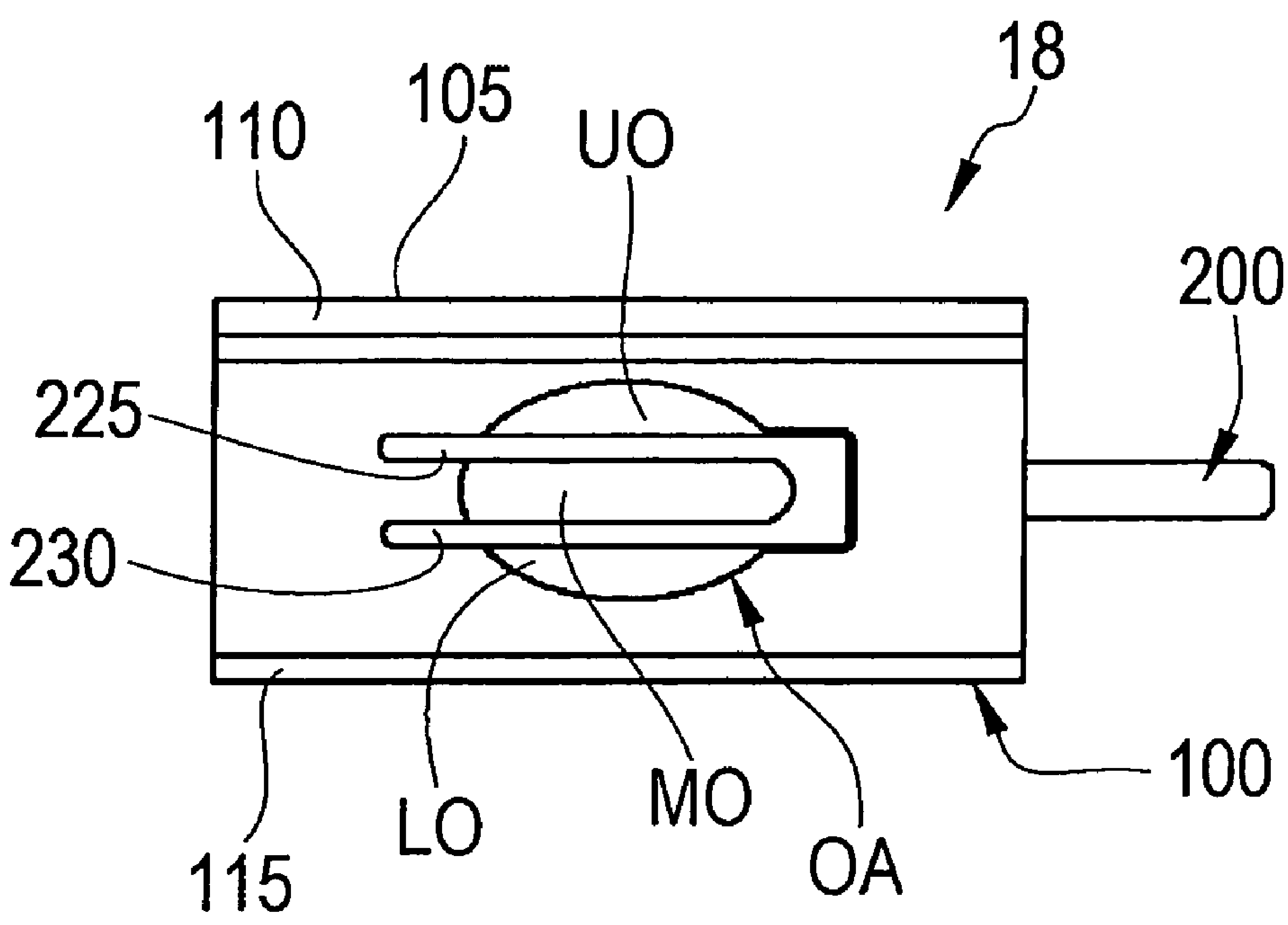
155
115
110
100

Fig.7


18
110
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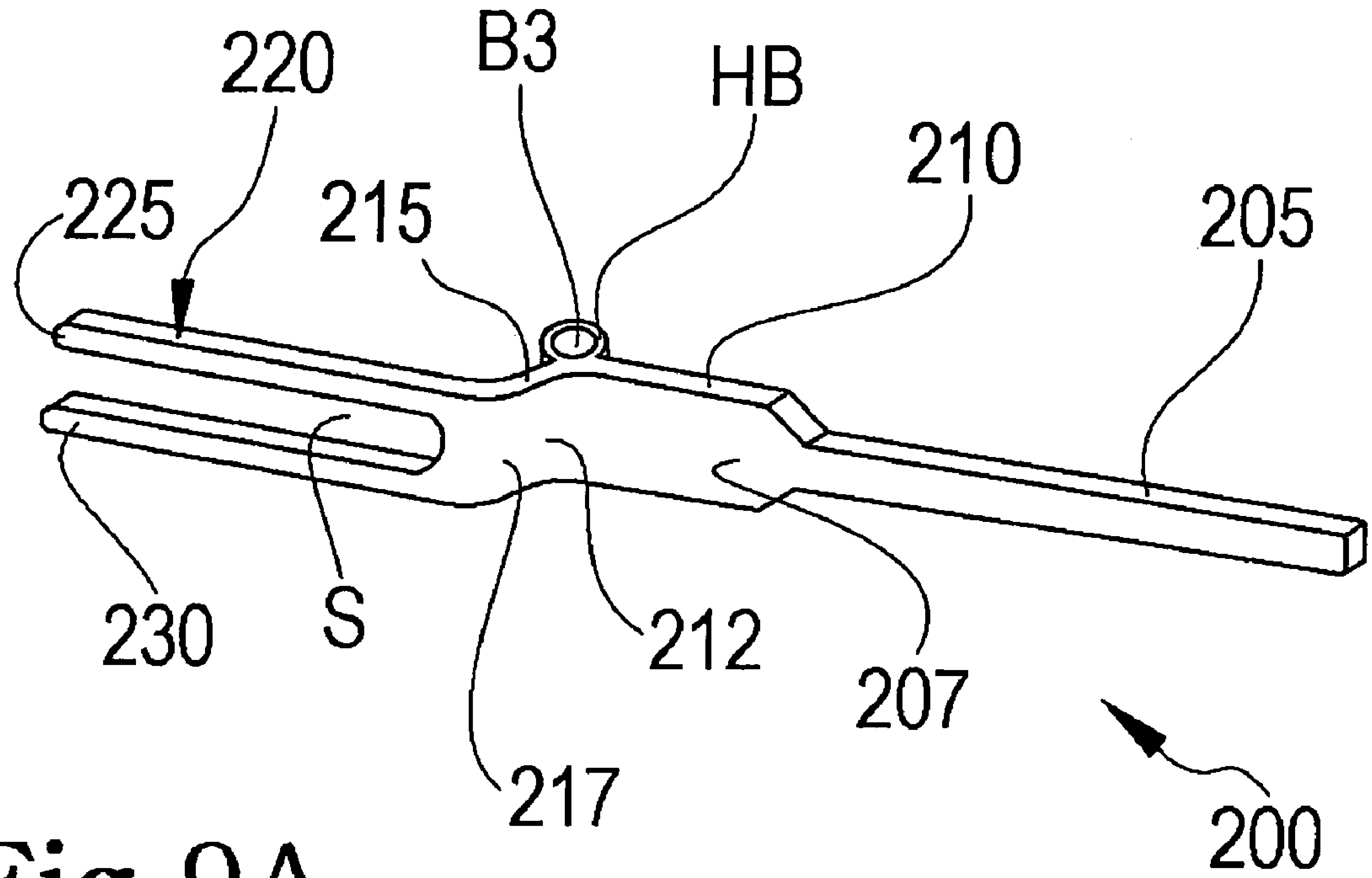
UO
200
225
230
100
115
LO
MO
OA

Fig.8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B3
HB
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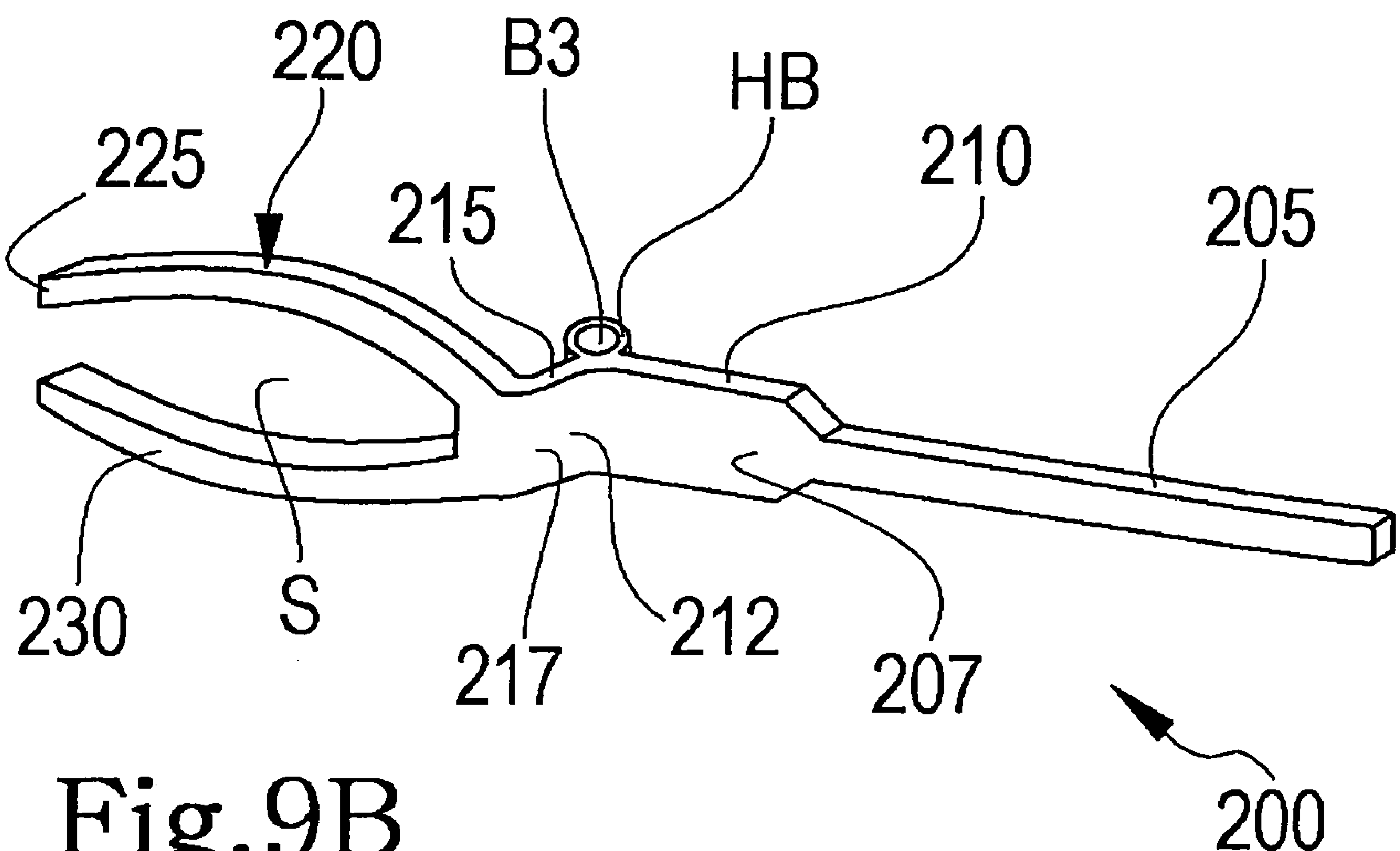
215
205
230
S
212
207
217
200

Fig.9A


220
B3
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210
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205
230
S
217
212
207
200

Fig.9B

SUCTION HEAD FOR SEDIMENT DREDGE

BACKGROUND

The present invention relates generally to sediment removal systems which are used in environmental clean-up of sediment in bodies of water such as lakes, ponds, rivers, etc. In particular, the present invention relates to apparatus located at terminal ends of such sediment removal systems, e.g. suction heads or dredge heads.

In general, sediment removal systems use suction pumps connected to suction heads or dredge heads by pipes, which are typically flexible hoses or other flexible, hollow, conduit-type members. SCUBA or other underwater divers can go underwater and manually move the suction/dredge heads about the bottom of the body of water, visually determining what material needs to be removed.

In order to remove sediment, the suction head is placed close enough to the sediment that the vacuum or suction force of the system draws the sediment into the and through the suction/dredge head, and into and through the connecting lines of hose.

As the sediment is drawn into the sediment removal system, the system vacuum force is not selective in drawing material into the suction/dredge head, and thence through the hoses. Thus, a certain amount of unwanted material is drawn into the sediment removal system along with the sediment which is desiredly being removed. The unwanted material can include stones and rocks, as well as a certain amount of organic vegetation.

Sediment removal systems are typically designed to remove smaller-size particles, such as sand, silt, sludge, muck, and the like, and so the equipment is designed to handle such smaller size particles. In the interest of efficiency of the system in handling such smaller size particles, the system is not designed primarily to handle larger stones and rocks. Thus, when a larger stone or rock gets into the system, the system can be damaged by the larger stone or rock. For example, a stone or rock can damage the impellers in a pump so that the efficacy of the pump is negated or severely degraded. Accordingly, certain steps have been taken to protect the moving parts of the system.

As one example, various filtering mechanisms have been employed, which are placed between the suction/dredge head and the pump. However, on occasion, various stones, rocks, and other relatively larger non-desired pieces of debris become lodged elsewhere in the system, such as in the hose between the filter and the suction/dredge head or at the dredge head opening.

Accordingly, efforts have been made to provide a filter mechanism at the suction/dredge head. Typical suction/dredge head filter mechanisms include one or more bars or a screen which is fixedly attached to the suction/dredge head. And one known suction/dredge head uses a hinged bar that covers part of the opening into the suction/dredge head.

However, all such previous filter mechanisms at the suction/dredge head have proved inadequate. The filter mechanisms, which include fixed bars or screens, plug with various particles and objects, whereby the user has to, with his or her hand, pull such particles and objects out of or away from the fixed bars or screens. Since the suction power generated by the pump can be substantial, the user, for safety and/or other reasons, must first de-energize the pump prior to removing the plugged particles and objects from the suction/dredge head.

The filter mechanisms which include a hinged bar have proven inadequate for the intended purpose of use for numerous reasons. As one example, the bar hingedly travels only a relatively short distance, whereby when hinged fully open, portions of the bar are relatively further from the opening of the suction/dredge head, yet the bar continues to extend over a column projected from the opening. Accordingly, when the bar is hingedly opened, and particles or objects communicating with the bar remain substantially in-line with the pull of the vacuum, whereby when the bar is hingedly opened, the particles or objects can of roll, slide, or otherwise deflect off the bar, into the path of vacuum pull, thence non-desiredly into and through the suction/dredge head.

As another example, filter mechanisms which include a hinged bar have proven inadequate because the hinged connection between the bar and the suction/dredge head is substantially loose which provides a substantial amount of free-play at the bar. Accordingly, the bar easily flops, droops, sags, hangs down, wobbles, and or otherwise non-desiredly freely moves. Because of this loose connection, the bar is easily displaced from the desired location across the opening of the suction/dredge head.

When the bar is at an extreme positions of displacement, the bar extend across a minor portion or very little of the opening, whereby the effective size of the opening, e.g. the largest unobstructed portion of the opening, remains sufficiently close to that of the opening without the bar extending there across, such that various non-desired particles and objects can still pass through the opening, into and through the suction/dredge head, and non-desiredly into various other portions of the system. In other words, when the bar is at an extreme position of displacement, the integrity of the filtering function provided by the bar is largely, and sometimes wholly, compromised, whereby the hinged bar substantially fails to provide the desired mechanical protection for the system.

Accordingly, it might prove desirable and/or beneficial to provide suction/dredge heads which can be cleared of plugging masses or blockages without having to de-energize the corresponding system pump.

It might prove beneficial to provide suction/dredge heads which include one or more movable members adapted and configured to clear plugging masses or blockages from the opening of the suction/dredge heads, without requiring the user to manually withdraw the plugging masses or blockages from the opening of the suction/dredge heads by using his or her hand.

It might prove beneficial to provide suction/dredge heads which include one or more movable members adapted and configured to clear plugging masses or blockages from the opening of the suction/dredge heads which are sufficiently stable so as to remain substantially static when the one or more movably members extends across the opening of the suction/dredge head, during use.

SUMMARY

The invention generally provides dredge heads, for use with a dredging system, which include one or more movable members, e.g. grate members, adapted and configured to selectively extend across the opening of the dredge head, as desired by a user. The movable member(s) enables a user to clear the dredge head of plugging masses or blockages without having to de-energize the dredge system pump. Also, the movable member(s) enable a user to clear the dredge head of plugging masses or blockages without requiring the user to manually withdraw the plugging masses or blockages from the opening of the suction/dredge heads by using his or her hand.

In a first family of embodiments, the invention comprehends a dredge head comprising: (a) a blade having a forward facing surface, a rearward facing surface, a thickness dimension, and an opening which extends through the thickness of the blade and defines a blade opening width dimension; (b) a header tube having a forward facing end, a rearward facing end, and an opening which extends axially between the forward and reward facing ends, through the header tube, the forward facing end of the header tube interfacing with the rearward facing end of the blade and the header tube opening and the blade opening generally coaxially aligned with each other; (c) a grate selectably extending across the blade opening and having an upper grate prong and a lower grate prong, the upper and lower grate prongs spaced from each other and defining an elongate slot therebetween, the grate movable between first and second positions, the grate in such first grate position extending across and communicating with the blade opening and the grate in such second grate position not extending across and communicating with the blade opening; and (d) an articulatable member movable between first and second positions and operably connected to the grate, the articulatable member in such first position corresponding to the grate in such first grate position and the articulatable member is such second position corresponding to the grate in such second grate position.

In some embodiments, the grate elongate slot defines a slot opening width dimension corresponding to the distance between the upper grate prong and a lower grate prong and a slot opening length dimension corresponding to the length dimension of ones of the upper grate prong and a lower grate prong, the magnitude of such slot length dimension greater than the magnitude of such slot width dimension.

In some embodiments, the grate is removably attached to ones of the blade and the head tube.

In some embodiments, the grate is generally planar.

In some embodiments, the grate is generally arcuate.

In some embodiments, the grate in such first grate position generally defines at least three openings which extend into the header tube opening.

In some embodiments, two of the at least three openings are generally hemispherical shaped openings and one of the at least three openings is a generally rectangular shaped opening.

In some embodiments, two of the at least three openings are generally crescent shaped openings and one of the at least three openings is a generally elliptical shaped opening.

In some embodiments, the dredge head is part of a dredging system.

In a second family of embodiments, the invention comprehends a dredge head comprising: (a) a blade having a forward facing surface a rearward facing surface, a thickness dimension, and an opening which extends through the thickness of the blade and defines a blade opening width dimension; (b) a header tube having a forward facing end, a rearward facing end, and an opening which extends axially between the forward and reward facing ends, through the header tube, the forward facing end of the header tube interfacing with the rearward facing end of the blade and the header tube opening and the blade opening generally coaxially aligned with each other; and (c) a grate pivotably attached to ones of the blade and the header tube, the grate pivotably movable between first and second positions, the grate in such first grate position extending across the blade opening and the grate in such second grate position not extending across the blade opening, the grate pivotable about an axis of pivotation which is generally displaced from the blade.

In some embodiments, the axis of pivotation is displaced outwardly from the blade forward facing surface, with the blade forward facing surface facing the axis of pivotation.

In some embodiments, the axis of pivotation displaced outwardly from the blade, with the blade rearward facing surface facing the axis of pivotation.

In some embodiments, the axis of pivotation is a generally vertical axis of pivotation.

In some embodiments, the axis of pivotation is generally perpendicular to an axis which extends through the length of the header tube bore.

In a third family of embodiments, the invention comprehends a dredge head comprising: (a) a blade having a forward facing surface a rearward facing surface, a thickness dimension, and an opening which extends through the thickness of the blade and defines a blade opening width dimension; (b) a header tube having a forward facing end, a rearward facing end, and an opening which extends. axially through the header tube, the header tube forward facing end interfacing the rearward facing surface of the blade, the header tube having a first lateral surface and a second lateral surface; and (c) an elongate grate having an end and pivotably attached to ones of the blade and the header tube, adjacent the first header tube lateral surface, the grate pivotably movable between first and second positions wherein when the grate is in such first grate position, the end of the grate positioned laterally beyond a straight-line projected from the second header tube lateral surface; and when the grate is in such second grate position, the end of the grate positioned generally between a straight-line projected from the first header tube lateral surface and a straight-line projected from the second header tube lateral surface.

In some embodiments, when the grate is in such second grate position, the end of the grate positioned generally between a straight-line projected from the first header tube lateral surface and a straight-line projected from the second header tube lateral surface and proximate the first header tube lateral surface.

In a fourth family of embodiments the invention comprehends a dredge head comprising: (a) a blade having a forward facing surface a rearward facing surface, a thickness dimension, and an opening which extends through the thickness of the blade; (b) a header tube attached to the blade and having a forward facing end, a rearward facing end, and an opening which extends axially through the header tube, the forward facing end of the header tube proximate the blade and the rearward facing end of the header tube distal the blade; and (c) a grate pivotably attached to ones of the blade and the header tube, the grate pivotably movable between first and second positions, the grate in such first grate position proximate the blade opening and the grate in such second grate distal the blade opening, the grate pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 50 degrees of pivoting travel.

In some embodiments, the grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 60 degrees of pivoting travel.

In some embodiments, the grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 70 degrees of pivoting travel.

In some embodiments, the grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 80 degrees of pivoting travel.

In some embodiments, the grate comprising a first elongate prong and a second elongate prong, the first and second prongs defining a void therebetween.

In some embodiments, the grate is removably attached to ones of the blade and the header tube.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a partially schematic, exploded view of a dredging system which includes two dredge heads of a first embodiment of the invention.

FIG. **2** shows an enlarged pictorial view of one of the two dredge heads of FIG. **1**.

FIG. **3** shows an exploded, pictorial view of a second embodiment of dredge heads of the invention.

FIG. **4** shows a front elevation of first dredge head blade of the invention.

FIG. **5** shows a side elevation of the dredge head of FIG. **3** with the grate removed and the pivot pin and nut in place.

FIG. **6** shows a top view of the dredge head of FIG. **2**, assembled.

FIG. **7** shows a top view of a third embodiment of dredge heads of the invention.

FIG. **8** shows a front elevation of the dredge head of FIG. **6**.

FIG. **9**A shows an enlarged pictorial view of the grate of FIG. **2**.

FIG. **9**B shows an enlarged pictorial view of a second embodiment of grates used in dredge heads of the invention.

The invention is not limited in its application to the details of construction or the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in other various ways. Also, it is to be understood that the terminology and phraseology employed herein is for purpose of description and illustration and should not be regarded as limiting. Like reference numerals are used to indicate like components.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIG. **1** shows a dredging system, i.e. dredging system **10**, which includes pump **12**, gravity filter **14**, Y-connector **16**, one or more dredge heads **18**, and various hoses such as hoses **20**, **22**, **24**A, **24**B. Dredging system **10** is adapted and configured to remove various materials e.g. muck, sludge, sediment, biomass, mud, and/or other non-desired materials, from the bottom surface of ponds, streams, lakes and/or other bodies of water.

Pump **12** includes a prime mover such an internal combustion engine or an electric motor, and a suction generating mechanism. The prime mover provides power to the suction generating mechanism which correspondingly creates suction power, whereby pump **12** provides the suction energy utilized by dredging system **10**.

Preferably, pump **12** is adapted and configured to move a volume of at least about 36-thousand gallons of liquid per hour. Although the particular pump **12** is selected so as to provide suitable suction or vacuum and move a sufficient volume of liquid, be it more or less, based on the intended use environment of dredging system **10**.

Gravity filter **14** functions to remove larger pieces of material from the stream of material being removed from the sediment bed of the body of water. The water-borne sediment stream enters filter **14** at the bottom of the filter canister, and effluent exits the filter at the top of the canister. The design is such that the heavier sediment particles/stones, rocks, fall out of the sediment stream and settle to the bottom of the canister. Although FIG. **1** illustrates a gravity filter, those skilled in the art are well aware of other suitable filtration mechanisms, such as, but not limited to, various other flow-through filters and/or others.

Pump **12** is connected to filter **14** by hose **20**. Gravity filter **14** is connected to Y-connector **16** by hose **22**. Y-connector **16** has one connector inlet member and two connector outlet members. In other words, Y-connector **16** splits the system suction power into two separate divergent paths, generally defined by and transmitted through the two connector outlet members and correspondingly through hoses **24**A and **24**B.

Hoses **24**A, **24**B extend between and connect ones of the two outlets of Y-connector **16** and respective ones of dredge head **18**. In embodiments which utilize two dredge heads **18**, such as that illustrated in FIG. **1**, dredge system **10** enables two users to simultaneously work together, each using a separate dredge head **18**, at locations proximate each other, whereby the divers can watch out for each other, and can both be gainfully employed in sediment removal.

Referring now to FIG. **2**, in general, suction heads, e.g. dredge heads **18** of the invention each includes blade **100**, header tube **150**, actuation mechanism **180**, and actuatable arm **200**. The entire assemblage of dredge head **18** is adapted and configured for relatively easy manipulation by a user, and to provide a means of attenuating the rate of entrance of non-desired debris into dredging system **10** through dredge head **18**. Dredge head **18** further enables a user to, as desired, remove, clear, eliminate, and/or otherwise purge debris from the dredge head, generally without requiring the user to remove such debris with his or her hand.

Blade **100** is a plow or clip which generally defines the front portion of dredge head **18** which, as illustrated, has a length dimension which generally defines the overall width of dredge head **18**, and is generally arcuate in profile. In other words, blade **100** defines a generally arcuate wall, first and second generally open end or side portions and a generally open front-most portion. The blade **100** is adapted and configured to contact and traverse surfaces such as bottom surfaces of bodies of water, and/or to contact, push, drag, cut through, agitate, and/or otherwise communicate or interface with substances and particles which are to be removed by dredging system **10**.

Blade **100** includes inner and outer surfaces, namely, surfaces **102** and **105**, respectfully. If the arcuate wall of blade **100** was arcingly projected to define a cylinder having generally the same radius as the radius of blade **100**, inner surface **102** would generally define the inner circumferential surface of such cylinder and outer surface **105** would generally define the outer circumferential surface of such cylinder. Namely, inner surface **102** faces generally forward, away from the remainder of dredge head **18** whilst outer surface **105**, at least a rearwardly facing portion thereof, faces generally rearward, toward the remainder of dredge head **18**.

Referring now to FIG. **4**, at least one opening or aperture extends generally medially through blade **100**, e.g. though the entire thickness thereof. The particular shape e.g. outside perimeter shape is selected so as to provide an aperture of desired opening dimensions and overall configuration. Exemplary of such suitable shapes, dimensions, and configurations, are round and oval which correspond to round aperture "RA" and oval aperture "OA" which are illustrated in dashed and solid lines, respectively.

Channel opening "CO" also extends through the entire thickness of blade **100**, proximate round aperture "RA" or oval aperture "OA." One end of channel opening "CO" opens and extends into the round or oval aperture "RA," "OA." In other words, the round or oval aperture "RA," "OA" and channel opening "CO," in combination, define an opening with at least first and second portions, one opening portion which generally defines an oval or circle and another portion which is generally elongate and extends from such oval or circular e.g. round opening.

Referring now to FIGS. **2**, **3**, **4**, and **5**, upper and lower leading edges **110** and **115**, respectively, define the terminal edge surfaces at the forward-most portion of blade **100**, whereby the wall which extends between upper leading edge **110** and lower leading edge **115** arcingly extends therebetween and generally defines a C-shaped profile when viewed from the side.

Referring now specifically to FIG. **5**, when viewed in side elevation, from the left side of dredge head **18**, the contour and profile of blade **100** defines a generally reverse-C profile configuration. Axis "A", viewed in end view in FIG. **5**, extends axially through the cavity within blade **100**, along the length thereof. In embodiments with a generally constant radius of blade **100**, axis A is generally radially displaced the same distance from ones of any given points along the inner circumferential surface of blade **100** e.g. inner surface **102**.

Upper edge **110** and lower edge **115** extend generally parallel to each other and are each displaced from an imaginary straight-line which extends through axis "A", generally perpendicular to header tube **150**. Namely, upper edge **110** and lower edge **115** lie on generally different sides of such imaginary straight line, whereby the distance between such line and upper edge **110** defines a first, upper distance "UD" and the distance between such line and lower edge **115** defines a second, lower distance "LD."

The magnitude of upper distance "UD" is at least about twice the magnitude of the lower distance "LD". The overall distance between upper edge **110** and lower edge **115**, as measured generally parallel to header tube **150**, corresponds to the sum of the upper and lower distances "UD" and "LD" and generally defines the upper-lower distance "ULD."

Although blade **100** is illustrated as defining an arcuate wall with a generally uniform radius and generally straight lines leading edges, other suitable configurations are contemplated and well within the scope of the invention. Such other suitable configurations include, but are not limited to, blades which are generally angular in profile, blades which have generally non-planar appearances when viewed from above e.g. V-shaped as viewed from above, and/or others.

Upper edge **110** and lower edge **115** each has a length dimension which corresponds to the overall width dimension of blade **100**. The magnitude of the length dimension of blade **100** is selected based at least in part on the particular intended use environment of dredge head **18**, and/or based on other factors. Exemplary of suitably width dimensions of blade **100** include width dimensions having magnitudes of at least about 4 inches, at least about 4½ inches, at least about 5 inches, at least about 5½ inches, at least about 6 inches, at least about 6½ inches, at least about 7 inches, at least about 7½ inches, at least about 8 inches, and others.

The magnitude of the overall height dimension of blade **100**, which corresponds to the distance between upper and lower edges **110**, **115**, includes any of a variety of suitable height dimensions, e.g. height dimensions having magnitudes of at least about 3 inches, at least about 3½ inches, at least about 4 inches, at least about 4½ inches, at least about 5 inches, at least about 5½ inches, at least about 6 inches, at least about 6½ inches, at least about 7 inches, and others.

The generally arcuate wall of blade **100** has a radius, or one or more radiused portions thereof, which provide blade **100** with a profile and thus scooping, pushing, plowing, digging, and/or other characteristics and functions which are suitable for the intended use environment. Namely, the generally arcuate wall of blade **100** defines a radius, or radiused portions thereof, of at least about 1½ inch, 2 inches, 2½ inches, 3 inches, and others.

Referring now to FIGS. **2** and **3**, thumb tab "T" is an elongate projection with a length, a width, and a thickness dimension, and further defines an upper and lower surface thereof. Thumb tab "T" is adapted and configured to support, interface with, and/or otherwise cooperate with, a thumb or finger of a user, as desired.

The lower surface of thumb tab "T" communicates with an upper portion of outer surface **105**, whereby the remainder of thumb tab "T" extends upwardly therefrom. Accordingly, the thickness dimension of thumb tab "T" corresponds generally to the distance which thumb tab "T" extends from outer surface **105**, e.g. the magnitude of the distance between outer surface **105** and the upper surface of thumb tab "T."

Thumb tab "T" is preferably positioned angularly and generally non-perpendicularly to e.g. upper and lower edges **110**, **115**, and angularly and generally non-parallel to e.g. header tube **150**. Nevertheless, thumb tab "T" can be mounted anywhere upon dredge head **18**, in any position and orientation, and have other characteristics and configurations which enable a user to grasp, hold, and/or otherwise manipulate dredge head **18** relatively more easily or comfortably as compared to dredge heads without such thumb tab "T." Optionally, dredge head **18** includes a plurality of thumb tabs "T," spaced from each other, which enable a user to grasp, hold, and/or otherwise manipulate dredge head **18** relatively more easily or comfortably as compared to dredge heads without ones of such thumb tabs "T."

Header tube **150** is an elongate, cylindrical member which extends generally perpendicularly from blade **100**. In addition, an opening extends generally axially through header tube **150**, whereby the header tube is a generally hollow member.

Header tube **150** generally defines various portions thereof, namely blade interface portion **155**, front header portion **165**, medial header portion **170**, and rear header portion **175**. The header tube **150** is adapted and configured to connect, and generally span between, blade **100** and various tubes, hoses, or other conduits, of dredge system **10**, such as ones of hoses **24**A, **24**B.

Blade interface portion **155** defines a first end of header tube **150**, proximate blade **100** and connected thereto. The particular shape and characteristics of the terminal end of blade interface portion **155** corresponds to e.g. contours, radii, outer circumferential surface characteristics of at least part of blade **100**. In other words, the end of blade interface portion **155** is notched, machined, formed, cut, grinded, and/or otherwise adapted and configured to suitably interface with the respective portion of outer blade surface **105**.

As one example, referring to FIGS. **4** and **7**, in embodiments which include oval blade apertures e.g. oval apertures "OA," blade interface portion **155** can include an oval crimp. Such oval crimp can be imparted to blade interface portion **155** by applying a vertically directed compressive force, sufficiently great in magnitude to squeeze the upper and lower surfaces of blade interface portion **155** relatively nearer each other, whereby the outer wall of blade interface portion **155** retains a generally oval shaped configuration.

In such embodiments, which have oval crimped blade interface portion ends, the lateral surfaces are flared laterally outwardly from the remainder of header tube **150**. Accordingly, when viewed from above, each of the lateral sides of an oval crimped blade interface portion **155** appears to arcuately transition between blade **100** and the remainder of header tube **150**, as illustrated in FIG. **7**.

As another example, referring to FIGS. **4** and **6**, in embodiments which include round blade apertures e.g. round apertures "RA," blade interface portion **155**, the end surfaces of the blade interface portion **155** defines a generally round shape, as viewed in an end view. In such embodiments, blade interface portion **155** extends generally perpendicularly from blade **100**, as illustrated in FIG. **6**. The end of blade interface portion **155** which is distal blade **100** is attached to front header portion **165**.

Front header portion **165** is a generally cylindrical member which is adjacent and extends away from blade interface portion **155**, namely away from blade **100**. The opening, which extends axially through blade interface portion **155**, opens and extends into an opening which extends axially through front header portion **165**. In some embodiments, the end of front header portion **165** which is distal blade **100** is connected to medial header portion **170**.

Medial header portion **170** is a generally cylindrical member, adjacent and extending away from, front header portion **165**, namely away from blade **100**. The opening which extends axially through blade interface portion **155** and front header portion **165** opens and extends into an opening which extends axially through medial portion **170**.

As illustrated in FIGS. **2** and **3**, as desired, medial header portion **170** can include one or more coupling mechanisms, which connect e.g. separable, distinct, portions of medial header portion **170**. Such coupling mechanisms, illustrated as generally annular rings which concentrically surround parts of medial header portion **170**, include, but are not limited to, threaded coupling mechanisms, snap-lock mechanisms, friction fit mechanisms, various adhesives and weldments, and/or other suitable coupling mechanisms.

In yet other embodiments, such as those illustrated in FIGS. **5**, **6**, and **7**, the medial portion of header tube **150** is generally devoid of coupling mechanisms, whereby medial header portion **170** is generally not required in the assemblage of header tube **150**. In such embodiments, front header portion **165** is connected generally -directly to rear header portion **175**. By contrast, in embodiments which include medial header portion **170**, front header portion **165** is connected generally indirectly to rear header portion **175**, through the medial header portion **170**.

Rear header portion **175** is a generally cylindrical member, adjacent and extending away from, medial header portion **170** and/or front header portion **165**, namely away from blade **100**. The opening which extends axially through blade interface portion **155**, front header portion **165**, optionally through medial portion **170**, opens and extends into an opening which extends axially through rear header portion **175**. In other words, a cavity extends through the aperture of blade **100** and axially through the entire length of header tube **150**.

Accordingly, the opening which extends through blade interface portion **155** is generally coaxially aligned with the opening which extends through blade **100**, be it round aperture "RA," oval aperture "OA," or others. Accordingly, as suction energy provided by pump **12** draws material e.g. muck, sediment, articles, materials, sludge, biomass, debris mud, and/or other substances, through the blade aperture "RA," "OA," such material is also drawn through the opening which extends through blade interface portion **155** and axially through the remainder of header tube **150**.

Rear header portion **175** is adapted and configured to be removably attached to various tubes, hoses, or other conduits, of dredge system **10**, such as ones of hoses **24**A, **24**B. Exemplary of such removable attachment structure and configuration are various threaded coupler devices, parts of which are illustrated in FIGS. **2**, **3**, **5**, **6**, and **7**. In embodiments which include threaded coupler devices and/or configurations, rear header portion **175** includes a threaded outer circumferential surface.

The characteristics of the threaded outer circumferential surface, of rear header portion **175**, corresponds to the characteristics of a threaded inner circumferential surface of a cooperating threaded coupling sleeve, attached to ones of the ends of e.g. hoses **24**A, **24**B. Namely, the cooperating threaded coupling sleeve and threaded outer circumferential surface of rear header portion **175** have threads with thread pitches and thread depths which correspond to each other, enabling a user to threadedly removably attach dredge head **18** to e.g. hoses **24**A, **24**B.

Nevertheless, rear header portion **175** can be otherwise adapted and configured to suitably, removably, attach dredge head **18** to hoses **24**A, **24**B. Such other suitable configurations include, but are not limited to, various snap-lock mechanisms, friction fit mechanisms, and/or others.

Referring now to FIGS. **2**, **3**, **5**, **6**, **7**, **8**, and **9**, actuation mechanism **180** includes upper pivot plate **182**, lower pivot plate **183**, pivot pin **184**, nut "N," and actuatable arm **200**.

Upper pivot plate **182** is a generally planar member with an upper surface, a lower surface, forward and rearward facing edge surfaces, and first and second lateral surfaces. Upper pivot plate **182** spans generally between and is connected to ones of blade **100** and header tube **155**. Namely, the first lateral edge surface of upper pivot plate **182** interfaces with and is attached to an outer side surface of blade interface portion **155**, whereby the second lateral edge surface faces generally outwardly away from header tube **150**.

The forward facing edge surface of upper pivot plate **182** interfaces with and is attached to a rearwardly facing portion of plow outer surface **105**, above channel opening "CO." Bore "B**1**" extends through the entire thickness of upper pivot plate **182**, illustrated in e.g. FIG. **3** as proximate the rearward facing edge surface and generally between the first and second lateral edge surfaces.

Lower pivot plate **183** is a generally planar member with an upper surface, a lower surface, forward and rearward facing edge surfaces, and first and second lateral surfaces. Lower pivot plate **183** spans generally between and is connected to ones of blade **100** and header tube **155**. Namely, the first lateral edge surface of lower pivot plate **183** interfaces with and is attached to an outer side surface of blade interface portion **155**, whereby the second lateral edge surface faces generally outwardly away from header tube **150**.

The forward facing edge surface of lower pivot plate **183** interfaces with and is attached to a rearwardly facing portion of plow outer surface **105**, below channel opening "CO." Bore "B**2**" extends through the entire thickness of lower pivot plate **183**, illustrated in e.g. FIG. **3** as proximate the rearward facing edge surface and generally between the first and second lateral edge surfaces. Bore "B**1**" of upper pivot plate **182** and bore "B**2**" of lower pivot plate **183** are generally coaxially aligned with each other, enable e.g. pivot pin **184** to pass therethrough.

The lower surface of upper pivot plate **182** and the upper surface of lower pivot plate **183** generally define a void i.e. cavity "C" therebetween. The opening of cavity "C," which is proximate blade **100**, is aligned with and opens and extends into cavity opening "CO" of blade **100**. In other words, the void of cavity opening "CO" extends through blade **100**, between upper and lower pivot plates **182**, **183**, and thus through cavity "C."

Pivot pin **184** is an elongate generally cylindrical structure adapted and configured to e.g. guide actuatable arm **200** in pivotal movement or travel. As illustrated in FIG. **5**, pivot pin

184 is a bolt with a bolt heads a bolt shaft, and a threaded end. Nut "N" is sized, adapted, and configured to cooperatively interface with the threads of the pivot pin threaded end. Accordingly, pivot pin 184 extends axially through bores "B1" and "B2" and is generally retained therein by the bolt head of pivot pin 184 and nut "N."

Namely, the downwardly facing surface, e.g. the shoulder, of the bolt head of pivot pin 184 interfaces with the upper surface of upper pivot plate 182 and mechanically resists forces which tend to urge pivot pin 184 downwardly through bores "B1," "B2." And the upper surface of nut "N" interfaces with the lower surface of lower pivot plate 183 and mechanically resists forces which tend to urge pivot pin 184 upwardly through bores "B1," "B2." Pivot pin 184 includes other configurations which may or may not utilize a nut "N." Exemplary of such other suitable pivot pins include, but are not limited to, various other bolts, rolled pins, forged pins, cast pins, extruded pins, and/or other pins, various securing devices e.g. cotter pins, and keys, captured pins, clevis pins, split cotters, and/or others.

Accordingly, in the complete assemblage of dredge head 18, pivot pin 184 generally defines an axis of pivotation which is generally displaced from blade 100, about which actuatable arm 20 pivots.

Actuatable arm 200 is adapted and configured to attenuate the rate at which non-desired debris and/or other non-desired materials enter and pass through dredge head 18, optionally to generally prevent entrance of such non-desired materials into dredge head 18. Accordingly, actuatable arm 200 is adapted and configured to generally slow the rate, minimize the likelihood, or prevent passage, of such non-desired materials into dredge system 10.

Actuatable arm 200 further enables a user to, as desired, remove, clear, eliminate, and/or otherwise purge debris and/or other non-desired materials from the dredge head, generally without requiring the user to remove such debris with his or her hand. In other words, a user of dredge head 18 can remove, clear, eliminate, and/or otherwise purge debris and/or other non-desired materials from the dredge head while generally maintaining his or her hand(s), positionally, behind blade 100.

Actuatable arm 200 is movably actuatable, e.g. pivotably, slidably, and/or otherwise movably. Actuatable arm 200 includes handle end portion 205, handle medial portion 207, handle base portion 210, first arcuate transition portion 212, connecting portion 215, second arcuate transition portion 217, and grate 220.

Referring now to FIGS. 9A, and 9B, handle end portion 205 is a generally elongate rigid member with first and second ends, forward and rearward facing surfaces, and upper and lower e.g. edge surfaces. The first end of handle end portion 205 faces generally away from the remainder of actuatable arm 200 and the second end of handle end portion 205 generally faces and is proximate the remainder of actuatable arm 200, and intersects handle medial portion 207.

Handle medial portion 207 includes first and second ends, a forward facing surface, a rearward facing surface, and upper and lower generally tapered surfaces. The forward and rearward facing surfaces of handle medial portion 207 are generally coplanar with respective ones of forward and rearward facing surfaces of handle end portion 205.

The first end of medial portion 207 connects to handle end portion 205 and defines a first width dimension. The second end of medial portion 207 connects to e.g. the remainder to actuatable arm 200 and defines a second width dimension. The magnitude of the second width dimension is greater than the magnitude of the first width dimension.

The upper tapered surface extends generally angularly upwardly between the uppermost point of intersection of handle end portion 205 and medial portion 207, and the uppermost point of intersection of medial portion 207 and handle base portion 210. The lower tapered surface extends generally angularly downwardly between the lowermost point of intersection of handle end portion 205 and medial portion 207, and the lowermost point of intersection of medial portion 207 and handle base portion 210. In other words, in some embodiments, handle end portion 205 is generally narrower than handle base portion 210 and medial portion 207 taperingly transitions between and connects handle end portion 205 and base portion 210.

Handle base portion 210 is a generally elongate rigid member with first and second ends, forward and rearward facing surfaces, and upper and lower e.g. edge surfaces. The first end of hand base portion 210 interfaces and is connected to handle medial portion 207 and the second end of hand base portion 210 interfaces and is connected to first arcuate transition portion 212.

Ones of the forward and rearward facing surfaces of handle base portion 210 are generally coplanar with respective ones of the forward and rearward facing surfaces of handle medial portion 207 and/or handle end portion 205. The upper and lower surfaces of handle base portion 210 extend generally parallel to each other, whereby handle base portion defines a generally constant width dimension along the length thereof.

First arcuate transition portion 212 includes forward and rearward facing surfaces, and upper and lower e.g. edge surfaces. First arcuate transition portion 212 is connected at a first end to handle base portion 210 and at a second end to connecting portion 215. Transition portion 212 extends generally arcuately, optionally straight-line angularly or otherwise, between such base portion 210 and connecting portion 215. Namely, first arcuate transition portion 212 extends generally arcuately away from the base portion 210, generally in the direction which the forward facing surface of base portion 210 faces.

Connecting portion 215 includes forward and rearward facing surfaces, and upper and lower e.g. edge surfaces. A first end of connecting portion 215 is connected to first arcuate transition portion 212 and a second end of connecting portion 215 is connected to second arcuate transition portion 217. Namely, connecting portion 215 generally defines an e.g. planar member which extends between and connects the first and second arcuate transition portions 212 and 217.

Second arcuate transition portion 217 includes forward and rearward facing surfaces, and upper and lower e.g. edge surfaces. Second arcuate transition portion 217 is connected at a first end to connecting portion 215 and at a second end to grate 220. Transition portion 217 extends generally arcuately, optionally straight-line angularly or otherwise, between such base connecting portion 215 and at a second end to grate 220. Namely, second arcuate transition portion 217 extends generally arcuately away from base connecting portion 215, whereby the end of second arcuate transition portion 217 which connects to grate 220 extends generally parallel to the direction in which handle base portion 210 extends.

In other words, first arcuate transition portion 212 and second arcuate transition portion 217 curvingly extend in generally opposite directions. Accordingly, in the entire assemblage of actuatable arm 200, first arcuate transition portion 212, connecting portion 215, and second arcuate transition portion 217, in combination, generally define a sigmoidal shape, outline, or perimeter, when viewed from above.

However, in some embodiments, actuatable arm 200 is generally devoid of first and second arcuate transition portions **212**, **217**, and base connecting portion **215**, whereby the actuatable arm **200** is generally straight-line linear between e.g. ones of end portion **205**, handle base portion **210**, and grate **220**.

Grate **220** includes at least one prong, preferably first and second prongs, namely upper prong **225** and lower prong **230**, optionally other prongs e.g. in addition to upper and lower prongs **225**, **230**, such as three or more prongs, as desired. The assemblage of grate **200** generally defines a second end portion of actuatable arm **200**, distal handle end portion **205**. Grate **220** is movable and adapted and configured to selectively extend across at least part of the aperture which extends through blade **100**.

Grate **220** is adapted and configured to prevent non-desired debris and materials, such as, but not limited to, rocks, sticks, other objects of certain minimum sizes, and/or others, from entering and traveling through dredge head **18** and thus into the remainder of dredging system **10**. At the same time, grate **220** permits passage of certain materials which are desiredly removed from e.g. the water body bottom. Accordingly, grate **220** is adapted and configured to balance the amount of obstruction which is employed to beneficially protect the system equipment, while still enabling passage of the desired sediments.

Upper prong **225** is an elongate generally rigid member with first and second ends, upper and lower surfaces, forward facing and rearward facing surfaces, and an end surface. The first end of upper prong **225** communicates with and is attached to second arcuate transition portion **217**

The forward facing surface of upper prong **225** generally faces the same direction as the forward facing surfaces of e.g. handle end portion **205**, handle medial portion **207**, and handle end portion **210**. Correspondingly, the rearward facing surface of upper prong **225** generally faces the same direction as the rearward facing surfaces of e.g. handle end portion **205**, handle medial portion **207**, and handle end portion **210**.

The upper surface of upper prong **225** generally faces the same direction as the upper surfaces of e.g. handle end portion **205** and handle end portion **210**. The lower facing surface of upper prong **225** generally faces the same direction as the lower surfaces of e.g. handle end portion **205**, handle medial portion **207**, and handle end portion **210**. And the end surface of upper prong **225** faces a generally opposite direction than the direction that the end surface of handle end portion **205** faces.

Referring now to FIGS. **6** and **8**, when actuatable arm **200** is in a first position, designated as position "P**1**" in FIG. **6**, upper prong **225** extends beyond the outer lateral perimeter of the blade aperture, and beyond e.g. the header tube/blade interface **155**. Namely, upper prong **225** extends beyond the header tube/blade interface **155** by at least about 1/64 inch, at least about 1/32 inch, at least about 1/16 inch, at least about 1/8 inch, at least about 1/4 inch, at least about 1/2 inch, at least about 5/8 inch, at least about 7/8 inch, optionally at least about 1 inch, optionally others.

Accordingly, in first position "P**1**," the rearward facing surface of upper prong **225**, at or adjacent the end of upper prong **225**, interfaces with the inner e.g. forward facing surface **102** of blade **100**. However, in other embodiments, upper prong **225** extends less than the entire distance across the blade aperture, whereby when actuatable arm **200** is in first position "P**1**," generally no part of the rearward facing surface upper prong **225** interfaces with the inner e.g. forward facing surface **102** of blade **100**.

In some embodiments, such as that illustrated in FIG. **9**B, upper prong **225** is generally arcuate, when viewed in a front elevation. In such embodiments, upper prong **225** extends arcuately, optionally straight-line linearly, upwardly from the point of intersection between upper prong **225** and second arcuate transition portion **217** to a maximum height or uppermost portion. From the maximum height or uppermost portion, upper prong **225** extends arcuately, optionally straight-line linearly, downwardly toward the terminal end thereof.

In some embodiments, such as that illustrated in FIG. **7**, upper prong **225** is generally arcuate, when viewed from above. In such embodiments, upper prong **225** extends arcuately, optionally straight-line linearly, outwardly from the point of intersection between upper prong **225** and second arcuate transition portion **217**, e.g. outwardly away from blade **100**, to a point of maximum extension or outermost portion. From the maximum extension or outermost portion, upper prong **225** extends arcuately, optionally straight-line linearly, inwardly toward blade **100** and toward the terminal end of the upper prong **225**.

Referring now to FIGS. **9**A and **9**B, lower prong **230** is an elongate generally rigid member with first and second ends, upper and lower surfaces, forward facing and rearward facing surfaces, and an end surface. The first end of lower prong **230** communicates with and is attached to second arcuate transition portion **217**

The forward facing surface lower prong **230** generally faces the same direction as the forward facing surfaces of e.g. handle end portion **205**, handle medial portion **207**, handle end portion **210**, and upper prong **225**. Correspondingly, the rearward facing surface of lower prong **230** generally faces the same direction as the rearward facing surfaces of e.g. handle end portion **205**, handle medial portion **207**, handle end portion **210**, and upper prong **225**.

The upper surface of lower prong **230** generally faces the same direction as the upper surfaces of e.g. handle end portion **205** and handle end portion **210**, and faces the lower surface of upper prong **225**. The lower facing surface of lower prong **230** generally faces the same direction as the lower surfaces of e.g. handle end portion **205**, handle medial portion **207**, handle end portion **210**, and upper prong **225**. The end surface of lower prong **230** faces a generally opposite direction than the direction that the end surface of handle end portion **205** faces.

The magnitude of the length dimension of ones of upper prong **225**, lower prong **230**, or other prong(s) is optionally less than about 3 inches but preferably at least about 3 inches, at least about 3.5 inches, at least about 4 inches, at least about 4.5 inches, and others.

The magnitude of the width dimension of ones of upper prong **225**, lower prong **230**, or other prong(s) is optionally less than about 1/8 inch but preferably at least about 1/8 inch, at least about 1/4 inch, at least about 3/8 inch, and others.

The distance between e.g. upper prong **225** and lower prong **230** has a magnitude of, for example, at least about 1/8 inch, at least about 1/4 inch, at least about 3/8 inch, at least about 1/2 inch, at least about 5/8 inch, at least about 3/4 inch, at least about 7/8 inch, at least about 1 inch, and others.

The distance between the upper surface of upper prong **225** and the lower surface of lower prong **230**, e.g. the overall width dimension of grate **220**, has a magnitude of, for example, at least about 1/2 inch, at least about 5/8 inch, at least about 3/4 inch, at least about 7/8 inch, at least about 1 inch, at least about 1 1/8 inch, at least about 1 1/4 inch, at least about 1 3/8 inch, at least about 1 1/2 inch, at least about 1 5/8 inch, at least about 1 3/4 inch, at least about 1 7/8 inch, at least about 2 inches, and others.

Referring now to FIGS. **6** and **9**A, a first angle e.g. the angle defined between handle ones of handle end portion **205**, handle medial portion **207**, handle base portion **210** and connecting portion **215**, and a second angle e.g. the angle defined between connecting portion **215** and grate **220**, generally correspond to each other. Namely, such first and second angles correspond in magnitude to each other, whereby ones of handle end portion **205**, handle medial portion **207**, handle base portion **210** and the grate **220** are parallel to each other, yet offset or stepped from each other e.g. are not coplanar with each other.

The distance measured perpendicularly between a straight-line projected from the rearward facing surface of grate **220** and the forward facing surfaces of ones of handle end portion **205**, handle medial portion **207**, and handle base portion **210** corresponds in magnitude to the magnitude of the thickness dimension of blade **100**. Accordingly, when actuatable arm **200** is in the first position "P**1**," the rearward facing surface of grate **220** closely communicates with and faces the inner e.g. forward facing surface **102** of blade **100**. Also, the forward facing surfaces of ones of handle end portion **205**, handle medial portion **207**, and handle base portion **210** closely communicate with and face the outer e.g. rearward facing surface **105** of blade **100**.

Referring now to FIGS. **6** and **8**, when actuatable arm **200** is in first position "P**1**" (FIG. **6**), lower prong **230** extends beyond the outer lateral perimeter of the blade aperture, and beyond e.g. the header tube/blade interface **155**. Namely, lower prong **230** extends beyond the header tube/blade interface **155** by at least about 1/64 inch, at least about 1/32 inch, at least about 1/16 inch, at least about 1/8 inch, at least about 1/4 inch, at least about 1/2 inch, at least about 5/8 inch, at least about 7/8 inch, optionally at least about 1 inch, optionally others.

Accordingly, in first position "P**1**," the rearward facing surface of lower prong **230**, at or adjacent the end of lower prong **230**, interfaces with the inner e.g. forward facing surface **102** of blade **100**. However, in other embodiments, lower prong **230** extends less than the entire distance across the blade aperture, whereby when actuatable arm **200** is in first position "P**1**," generally no part of the rearward facing surface lower prong **230** interfaces with the inner e.g. forward facing surface **102** of blade **100**.

In some embodiments, such as that illustrated in FIG. **9**B, lower prong **230** is generally arcuate, when viewed in a front elevation. In such embodiments, lower prong **230** extends arcuately, optionally straight-line linearly, downwardly from the point of intersection between lower prong **230** and second arcuate transition portion **217** to a minimum height or lowermost portion thereof. From the minimum height or lowermost portion, lower prong **230** extends arcuately, optionally straight-line linearly, upwardly toward the terminal end thereof.

In some embodiments, such as that illustrated in FIG. **7**, lower prong **230** is generally arcuate, when viewed from above. In such embodiments, lower prong **230** extends arcuately, optionally straight-line linearly, outwardly from the point of intersection between lower prong **230** and second arcuate transition portion **217**, e.g. outwardly away from blade **100**, to a point of maximum extension or outermost portion. From the maximum extension or outermost portion, lower prong **230** extends arcuately, optionally straight-line linearly, inwardly toward blade **100** and toward the terminal end of the lower prong **230**.

Referring now to FIGS. **3**, **9**A, and **9**B, actuatable arm **200** includes a connecting mechanism e.g. hinge barrel "HB," which is adapted and configured to, alone or in combination with other components, connect arm **200** to the remainder of dredge head **18**. Hinge barrel "HB" is an elongate, cylindrical member with an upper end, a lower end, and an outer circumferential surface. A through bore, namely bore "B**3**," extends axially through hinge barrel "HB."

Hinge barrel "HB" extends generally upright and vertically and is fixedly attached the remainder of actuatable arm **200**. In other words, a portion of the outer circumferential surface of hinge barrel "HB" is attached to the rearward facing surface, optionally the forward facing surface, of handle base portion **210**, adjacent the intersection of base portion **210** and first arcuate transition portion **212**, optionally elsewhere along the length of actuatable arm **200**.

In the entire assemblage of dredge head **18**, hinge barrel "HB" is generally housed within the actuation mechanism **180**, e.g. between upper pivot plate **182** and lower pivot plate **183**, whereby actuatable arm **200** is pivotably connected to the remainder of dredge head **18**. In other words, hinge barrel "HB" occupies part of the void within channel "C."

The magnitude of the length dimension of hinge barrel "HB" corresponds to the distance between the lower surface of upper pivot plate **182** and the upper surface of pivot plate **183**. Namely, hinge barrel "HB" fits snugly between the upper and lower pivot plates **182**, **183**, yet freely enough to sufficiently enable a user to, using one hand, pivotably actuate actuatable arm **200** as desired.

Referring now to FIG. **3**, when actuatable arm **200** is pivotably connected to the remainder of dredge head **18**, bore "B**1**" of upper pivot plate **182**, bore "B**3**" of actuatable arm **200**, and bore "B**2**" of lower pivot plate **183**, are generally coaxially aligned with each other. Pivot pin **184** extends axially through bores "B**1**," "B**2**," and "B**3**" thereby pivotably attaching actuatable arm **200** to e.g. upper and lower pivot plates **182**, **183**. The particular spatial, dimensional, frictional, and/or other characteristics and relationships realized and/or defined between respective ones of upper and lower pivot plates **182**, **183**, pivot pin **184**, hinge barrel "HB," and others, are selected to suitably provide the desired use characteristics of dredge head **18** e.g. desired amount of free-play between actuatable arm **200** and the remainder of dredge head **18**, and/or others.

In the complete assemblage of dredge head **18**, the actuatable arm **200** is generally free of freely or loosely wobbling characteristics or otherwise generally free from movement in non-desired manners, with respect to the other components of dredge head **18**. In other words, when a user applies a force, upwardly or downwardly upon handle end portion **205**, actuatable arm **200** generally does not wobble upon pivot pin **184**, whereby the shape, dimensions, and overall perimeter characteristics of the blade apertures remain generally or substantially the same as the shape, dimensions, and overall perimeter characteristics of the blade apertures when handle end portion **205** is generally not under such user applied force.

The clearance between e.g. (i) the upper surface of hinge barrel "HB" and/or other upper surfaces of actuatable arm **200** and the lower surface of upper pivot plate **182**, and/or (ii) the lower surface of hinge barrel "HB" and/or other lower surfaces of actuatable arm **200** and the upper surface of lower pivot plate **183**, and/or (iii) other portions of actuatable arm **200** which interface or communicate with respective portions of actuation mechanism **180**, is less than about 1/4 inch, less than about 3/16 inch, less than about 1/8 inch, less than about 1/16 inch, less than about 1/32 inch, and others, as desired.

Accordingly, in the complete assemblage of dredge head **18**, hinge barrel "HB" and/or other portions of actuatable arm **200** which interface or communicate with respective portions of actuation mechanism **180**, extend along and e.g. cover more than about 1/2 of the length of pivot pin **184**, at least about 2/3 of the length of pivot pin **184**, at least about 3/4 of the length of pivot pin **184**, at least about ⅞ of the length of pivot pin **184**, and others, as desired.

In some embodiments of the complete assemblage of dredge head **18**, hinge barrel "HB" and/or other portions of actuatable arm **200** which interface or communicate with respective portions of actuation mechanism **180**, extend along and e.g. cover more than about ½ of the portion of the length of pivot pin **184** which extends between upper and lower pivot plates **182**, **183**, at least about ⅔ of the portion of the length of pivot pin **184** which extends between upper and lower pivot plates **182**, **183**, at least about ¾ the portion of the length of pivot pin **184** which extends between upper and lower pivot plates **182**, **183**, at least about ⅞ of the portion of the length of pivot pin **184** which extends between upper and lower pivot plates **182**, **183**, and others, as desired.

Referring now to FIGS. **6** and **8**, when actuatable arm **200** is in first position "P**1**," grate **220** and/or the prong(s) which at least partially define grate **220**, extend across the blade aperture and thereby define separate, distinct portions of the blade aperture. The number, shapes, profiles, and other configurations of the distinct aperture portions are based, at least in part, on e.g. the number, shapes, and configurations, of the prongs of actuatable arm **200**.

As one example, in embodiments of dredge head **18** which include a single prong, when actuatable arm **200** is in first position "P**1**," the single prong generally separates the opening of the blade aperture into first and second portions, the first opening above the single prong and the second opening below the single prong.

As another example, in embodiments of dredge head **18** which include upper and lower prongs **225** and **230**, such as the embodiment illustrated in FIG. **8**, the actuatable arm **200**, in the first position "P**1**," generally defines first second and third opening which extend into the blade aperture.

Namely, the portion of oval aperture "OA" which is generally between the upper surface of upper prong **225** and the upper portion of the perimeter of oval aperture "OA" generally defines upper opening "UO." The portion of oval aperture "OA" which is generally between the lower surface of upper prong **225** and the upper surface of lower prong **230** generally defines medial opening "MO." And the portion of oval aperture "OA which is generally between the lower surface of lower prong **230** and the lower portion of the perimeter of oval aperture "OA" generally defines lower opening "LO."

Accordingly, upper opening "UO" has a generally planar lower perimeter edge and a generally arcuate upper perimeter edge. Medial opening "MO" has generally planar upper and lower perimeter edges, generally parallel to each other, and generally arcuate side perimeter edges. Lower opening "LO" has a generally planar upper perimeter edge and a generally arcuate lower perimeter edge.

In embodiments of dredge head **18** which include arcuate upper and lower prongs **225**, **230**, such as that illustrated in FIG. **9**B, upper and lower openings "UO" and "LO" have generally crescent shaped perimeter edges. Also in such embodiments, medial opening "MO" defines a generally elliptical perimeter.

In embodiments in which actuatable arm **200** includes three or more prongs, the actuatable arm **200** generally defines four or more openings which extend into the blade aperture. The particular shape, profile, and/or other configuration of ones of the openings correspond to the particular shape, profile, and/or other configuration, of ones of the prongs of actuatable arm **200**.

Referring now to FIGS. **2**, **3**, **5**, **6**, and **7**, and more particularly to e.g. actuatable interactions between various components of dredge head **18**, in the complete assemblage of dredge head **18**, actuatable arm **200** is pivotably attached to the remainder of the dredge head. In other words, actuatable arm **200** is adapted and configured to pivotably move between first position "P**1**" and a second position "P**2**" (FIG. **6**).

Regarding the complete assemblage of dredge head **18**, a first portion of actuatable arm **200** lies generally movably in front of the inner e.g. forward facing surface **102** of blade **100** whilst a second portion of actuatable arm **200** lies generally movably rearward of the outer e.g. rearward facing surface **105** of blade **100**. Namely, grate **220** and/or other parts of actuatable arm **200** are pivotably and/or otherwise movably positioned in front of or forward of blade inner surface **102**, generally within the cavity or void defined within inner surface **102** of the arcuate wall of blade **100**. Handle end portion **205** and/or other parts of actuatable arm **200** are pivotably and/or otherwise movably positioned behind the rearward facing outer surface **105** of blade **100**.

When actuatable arm **200** is in position "P**1**" (FIG. **6**), as discussed in greater detail elsewhere herein, portions of the actuatable arm **200**, such as grate **220**, movably and selectably extend across portions of the aperture of blade **100**, e.g. oval or round aperture "OA," "RA." And when actuatable arm **200** is in position "P**2**," portions of the arm **200** such as grate **220** generally do not extend across, cover, or communicate with, the blade aperture. The user pivots actuatable arm **200** to infinitely vary the position of the arm **200**, in real-time, between first position "P**1**" and second position "P**2**" as desired.

Referring now to FIG. **6**, the pivotable travel of actuatable arm **200** can be generally defined with respect to the arcuate or pivotable travel of handle end portion **205**. Namely, angle α generally defines the pivotably distance traveled as actuatable arm **200** pivots from first position "P**1**" to second position "P**2**," about an axis of pivotation generally defined by pivot pin **184**.

Since grate **220** is fixedly attached to handle end portion **205**, directly or by way of various intermediary structures such as, but not limited to, various ones of handle medial portion **207**, handle base portion **210**, first arcuate transition portion **212**, connecting portion **215**, and second arcuate transition portion **217**, as handle end portion **205** pivotably travels in a first direction, grate **220** correspondingly pivotably travels in a second, generally opposite, direction. Accordingly, the angular distance traveled by handle end portion **205** and grate **220** correspond to each other.

The magnitude of angle α is selected to provide suitable use characteristics of dredge head **18**. In other words, the magnitude of angle α is sufficiently great so that as handle end portion **205** is pivoted toward position "P**2**," the non-desired debris and/or other non-desired materials which accumulate at, on, and/or otherwise adjacent, grate **220**, slides from, falls from, or is e.g. otherwise, eliminated, ridded, and/or otherwise removed from grate **220**, without decreasing the suction power provided by pump **12**.

The magnitude of angle α can be any of a variety of suitable magnitudes of angles, which include, but are not limited to, e.g. at least about 45 degrees, at least about 50 degrees, at least about 55 degrees, at least about 60 degrees, at least about 65 degrees, at least about 70 degrees, at least about 75 degrees, at least about 80 degrees, at least about 85 degrees, and others.

When actuatable arm **200** is in first position "P**1**," the end of the grate **220** is positioned laterally beyond a straight-line projected from the second header tube lateral surface which is most proximate the end of grate **220** (FIG. **6**). And when the actuatable arm **200** is in the second position "P**2**," the end of grate **220** is positioned generally between a straight-line projected from a first header tube lateral surface and a straight-line projected from a second header tube lateral surface, optionally laterally outwardly beyond such straight-line projected from the second header tube lateral surface.

To use dredge head **18**, the user connects, e.g. threadedly or otherwise couples, rear header portion **175** to a suitable hose such as ones of hoses **24**A, **24**B. The user then energizes pump **12** and thereby activates the dredging system **10**, and dives or submerges to the bottom of the body of water to be cleaned.

The user grippingly holds dredge head **18** by way of grasping various portions thereof and preferably by also clutching thumb tab “T” with his or her thumb. Once the user secures dredge head **18** in his or her hand, the user manipulates dredge head **18** so that blade **100** interfaces the bottom surface of the body of water and thus interfaces the various materials to be removed e.g. muck, sludge, sediment, biomass, mud, and/or other non-desired materials.

The non-desired materials are then suctioningly forced upwardly through dredge head **18**, the hose or series of hoses, into and/or through gravity filter **14**, whereby the materials which pass through gravity filter **14** ultimately pass through and are discharged from pump **12**, hence removed from the bottom surface of the body of water.

As certain materials and/or objects accumulate at grate **220**, the user clears such debris e.g. material accumulation and/or material obstruction of dredge head **18** by pivoting actuatable arm **200**. Namely, as the user desires to clear the debris from dredge head **18**, the user applies a force to handle end portion **205** which urges handle end portion **205** arcuately back, generally toward e.g. rear header portion **175** and the hose connected to the dredge head **18**, whereby actuatable arm pivots from first position “P**1**” toward second position “P**2**.”

As handle end portion **205** pivots arcuately backwardly, grate **220** pivots generally arcuately forward and laterally, about a common axis of pivotation defined by pivot pin **184**. When grate **220** is pivoted sufficiently far, in other words when actuatable arm is pivoted sufficiently close to second position “P**2**,” the materials and/or objects which are accumulated upon grate **220** are generally out of the suction line or suction column which extends outwardly from the blade apertures, e.g. round or oval aperture “RA,” “OA,” so that the materials and/or objects which are accumulated upon grate **220** are under relatively less influence of the suction force of dredge head **18**. Accordingly, when the suction force applied to such materials and/or objects which are accumulated upon grate **220** is sufficiently low, the materials and/or objects which are accumulated upon grate **220**, slide from, fall from, or are e.g. otherwise, eliminated, ridded, and/or otherwise removed, gravitationally or otherwise, from grate **220**.

Then, once dredge head **18** is sufficiently cleared, the user pivots actuatable arm **200** back toward first position “P**1**,” whereby grate **220** extends generally across the blade aperture, thereby providing a mechanical interface which protects dredge system **10** from having at least some non-desired objects/materials entering thereinto.

In some embodiments, the surface area defined by the rearwardly facing surfaces of prongs **225**, **230** is sufficiently great so that the suction force of dredge head **18** suctioningly urges grate **220** against blade **100**. In other words, in some embodiments, the suction generated by pump **12** pulls and holds the grate **220** back against blade **100**, whereby the resting condition of actuatable arm **200**, when pump **12** is energized, is the first position “P**1**.” Nevertheless, in such embodiments, grate **220** is adapted and configured, e.g. the surface area of grate **220** is sufficiently small, so that the user can overcome such suctioningly biasing force, which enables a user to pivotably move actuatable arm **200** between the first and second positions “P**1**,” “P**2**,” as desired.

Although dredge head **18** has been described with respect to embodiments having actuation mechanism **180** and thus pivot pin **184** located on a first side of the dredge head device, and accordingly having actuatable arm **200** extending generally in a first direction, it is fully appreciated and well within the scope of the invention that dredge head **18** can include e.g. actuation mechanism **180** and thus pivot pin **184** located on a second, opposite side of the dredge head device, and accordingly have actuatable arm **200** extending in a generally second, opposite direction. In such embodiments, the dredge head **18** is generally a mirror image of the illustrated embodiments, as reflected about a line which extends medially through the dredge head **18**.

In some embodiments, dredge head **18** includes first and second actuatable arms **200**. The actuatable arms **200** can be located on and/or pivot from generally the same side of the dredge head whereby, for example, the arms **200** are vertically or otherwise stacked with respect to each other. Optionally, ones of the plurality of actuatable arms **200** are located on and/or pivot from different sides of the dredge head **18**, whereby, for example, the arms **200** are stacked with respect to each other or have e.g. intertwining or otherwise interfacing components such as various cooperating prongs.

In yet other embodiments, actuatable arm(s) **200** can pivot generally upwardly, downwardly, or otherwise, besides laterally as illustrated. For example, in embodiments in which an actuatable arm pivots generally upwardly or downwardly, various components of dredge head **18** are located at e.g. upper or lower portions thereof. In other words, in embodiments in which an actuatable arm **200** is pivotably movable generally arcuately upwardly or downwardly, actuation mechanism **180**, pivot pin **184**, cavity “C,” cavity opening “CO,” and/or other components, are e.g. rotated about 90 degrees and adapted and configured to the dredge head **18**, whereby gate **220** is adapted and configured to pivot generally or generally downwardly, as desired.

Preferably, dredge head **18** is made of materials which resist corrosion, and are suitably strong and durable for normal extended use. Those skilled in the art are well aware of certain metallic and non-metallic materials which possess such desirable qualities, and appropriate methods of forming such materials.

Appropriate metallic materials for components of movable outdoor dredge head **18**, such as but not limited to blade **100**, header tube **150**, actuation mechanism **180**, pivot pin **184**, actuatable grate **200**, and/or others, include, but are not limited to, anodized aluminum, aluminum, steel, stainless steel, titanium, magnesium, brass, and their respective alloys. Common industry methods of forming such metallic materials include: casting, forging, shearing, bending, machining, riveting, welding, powdered metal processing, extruding, molding, and others.

Non-metallic materials suitable for components of dredge head **18** are various polymeric compounds, such as for example and without limitation, various of the polyolefins, such as a variety of the polyethylenes, e.g. high density polyethylene, or polypropylenes. There can also be mentioned as examples such polymers as polyvinyl chloride and chlorinated polyvinyl chloride copolymers, various of the polyamides, polycarbonates, and others.

For any polymeric material employed in structures of the invention, any conventional additive package can be included such as, for example and without limitation, slip agents, antiblock agents, release agents, anti-oxidants, fillers, and plasticizers, to control e.g. processing of the polymeric material as well as to stabilize and/or otherwise control the properties of the finished processed product, also to control hardness, bending resistance, and the like.

Common industry methods of forming such polymeric compounds will suffice to form non-metallic components of dredge head **18**. Exemplary, but not limiting, of such processes are the various commonly-known plastics converting processes.

Dredge head **18** is preferably manufactured as individual components, and the individual components assembled as sub-assemblies, including but not limited to, blade **100**, header tube **150**, actuation mechanism **180**, pivot pin **184**, nut "N," actuatable grate **200**, and/or others. Each of the aforementioned sub-assemblies is then assembled to respective other ones of the sub-assemblies to develop dredge head **18**.

Those skilled in the art will now see that certain modifications can be made to the apparatus and methods herein disclosed with respect to the illustrated embodiments, without departing from the spirit of the instant invention. And while the invention has been described above with respect to the preferred embodiments, it will be understood that the invention is adapted to numerous rearrangements, modifications, and alterations, and all such arrangements, modifications, and alterations are intended to be within the scope of the appended claims.

To the extent the following claims use means plus function language, it is not meant to include there, or in the instant specification, anything not structurally equivalent to what is shown in the embodiments disclosed in the specification.

The invention claimed is:

1. A dredge head comprising:

a) a blade having an arcuate cross-sectional profile with a forward facing surface, a rearward facing surface, and a thickness therebetween, said blade having a blade opening and a channel opening both of which extend through said thickness, and said channel opening being positioned adjacent to said blade opening;

b) a header tube having a forward facing end, a rearward facing end, and an aperture which extends axially therethrough said forward facing end interfacing with said rearward facing surface of said blade, and said aperture being coaxially aligned with said blade opening and being positioned adjacent to said channel opening;

c) a grate extending completely across and beyond said blade opening, said grate having an upper grate prong spaced apart from a lower grate prong and defining an elongate slot therebetween, said grate being movable between a first position and a second position, and when said grate is in said first position, said upper grate prong, said lower grate prong and said elongated slot extends across and beyond said blade opening and said upper and lower grate prongs contact said forward facing surface and partially limits flow through said blade opening, and when said grate is in said second position, said upper grate prong, said lower grate prong and said elongated slot are aligned at an angle to said blade opening and said upper and lower grate prongs are less restrictive in limiting flow through said blade opening; and

d) an articulatable member pivotably secured to said header tube and being operably connected to said grate, said articulatable member being movable between a first position which corresponds to said first position of said grate and a second position which corresponds to said second position of said grate, and said articulatable member having a handle integrally formed with said grate and being offset at an angle therefrom by a first arcuate transition portion.

2. The dredge head of claim **1** wherein said upper and lower grate prongs are joined together at said first arcuate transition portion, said first arcuate transition portion being located at one end of said elongated slot, and said elongated slot having a width dimension that corresponds to the distance between said upper and lower grate prongs and a length dimension that corresponds to the length dimension of each of said upper and lower grate prongs, and said length dimension being greater than said width dimension.

3. The dredge head of claim **2** wherein said articulatable member is pivotably secured to both said header tube and to said rear facing surface of said blade by a single pivot pin.

4. The dredge head of claim **3** wherein said blade opening and said channel opening are aligned parallel to one another and said articulatable member passes through said channel opening.

5. The dredge head of claim **2** wherein said first arcuate transition portion is positioned in said channel opening and a hinge barrel is secured to said first arcuate transition portion.

6. The dredge head of claim **2** wherein when said grate is in said first position, said upper and lower prongs create only three openings which extend into said blade opening.

7. The dredge head of claim **3** wherein said blade has a reverse C-shaped profile with a longitudinal central axis which extends lengthwise through said profile, and said pivot pin is aligned tangential to said rear facing surface of said blade and perpendicular to said longitudinal central axis.

8. The dredge head of claim **2** wherein each of said upper and lower prongs has a forward facing surface, a portion of which contacts said forward facing surface of said blade, and said handle has a rearward facing surface, a portion of which contacts said rearward facing surface of said blade.

9. A dredging system comprising said dredge head of claim **7**.

10. A dredge head comprising:

a) a blade having a reverse C-shaped, arcuate cross-sectional profile with a longitudinal central axis which extends lengthwise through said profile, said blade having a forward facing surface, a rearward facing surface, and a thickness therebetween, said blade having a blade opening and a channel opening both of which extend through said thickness, and said channel opening being positioned adjacent to said blade opening;

b) a header tube having a forward facing end, a rearward facing end, and an aperture which extends axially therethrough said forward facing end interfacing with said rearward facing surface of said blade, and said aperture being coaxially aligned with said blade opening and being positioned adjacent to said channel opening;

c) a grate extending completely across and beyond said blade opening, said grate having an upper grate prong spaced apart from a lower grate prong and defining an elongate slot therebetween, said grate being pivotably movable between a first position and a second position, and when said grate is in said first position, said upper grate prong, said lower grate prong and said elongated slot extends across and beyond said blade opening and said upper and lower grate prongs contact said forward facing surface of said blade and partially limits flow through said blade opening, and when said grate is in said second position, said upper grate prong, said lower grate prong and said elongated slot are aligned at an angle to said blade opening and said upper and lower grate prongs are less restrictive in limiting flow through said blade opening and said grate is pivotable about an axis of pivotation which is displaced from said blade;

d) an articulatable member pivotably secured to said header tube and being operably connected to said grate, said articulatable member being movable between a first position which corresponds to said first position of said grate and a second position which corresponds to said second position of said grate, and said articulatable member having a handle integrally formed with said grate and being offset at an angle therefrom by a first arcuate transition portion; and

e) a thumb tab secured to said rearward facing surface of said blade and spaced apart from said header tube, said thumb tab configured to enable a user of said dredge head to grasp and manipulate said dredge head.

11. The dredge head of claim **10** wherein said axis of pivotation of said grate is displaced from said blade and a pivot pin is aligned tangential to said blade and perpendicular to said longitudinal central axis.

12. The dredge head of claim **11** wherein said axis of pivotation of said grate is displaced from said blade and said rearward facing surface of said blade faces said axis of pivotation.

13. The dredge head of claim **10** wherein a plurality of said thumb tabs are secured to said rearward facing surface of said blade and said plurality of thumb tabs are spaced apart from one another.

14. The dredge head of claim **10** wherein said axis of pivotation is perpendicular to an axis which extends through said aperture formed in said header tube, and said dredge head is constructed from a non-metallic material.

15. A dredging system comprising said dredge head of claim **14**.

16. A dredge head comprising:

a) a blade having a reverse C-shaped, arcuate cross-sectional profile with a longitudinal central axis which extends lengthwise through said profile, said blade having a forward facing surface, a rearward facing surface, and a thickness therebetween, said blade having a blade opening and a channel opening both of which extend through said thickness, and said channel opening being positioned adjacent to said blade opening;

b) a header tube having a forward facing end, a rearward facing end, and an aperture which extends axially therethrough, said forward facing end interfacing with said rearward facing surface of said blade, said aperture being coaxially aligned with said blade opening and being positioned adjacent to said channel opening, and said header tube having a first lateral surface and a second lateral surface;

c) an elongate grate positioned adjacent to said first lateral surface of said header tube, extending completely across and beyond said blade opening, said elongate grate having an upper grate prong spaced apart from a lower grate prong and defining an elongate slot therebetween, said elongate grate having an end and being pivotably movable between a first position and a second position, and when said grate is in said first position, said upper grate prong, said lower grate prong and said elongated slot extends across and beyond said blade opening and said upper and lower grate prongs contact said forward facing surface of said blade and partially limits flow through said blade opening, and when said grate is in said second position, said upper grate prong, said lower grate prong and said elongated slot are aligned at an angle to said blade opening and said upper and lower grate prongs are less restrictive in limiting flow through said blade opening and said grate is pivotable about an axis of pivotation which is displaced from said blade; and

d) an articulatable member pivotably secured to said header tube and being operably connected to said grate, said articulatable member being movable between first position which corresponds to said first position of said grate and a second position which corresponds to said second position of said grate, and said articulatable member having a handle integrally formed with said grate and being offset at an angle therefrom by a first arcuate transition portion

wherein when said grate is in said first position, said end of said grate is positioned laterally beyond a straight-line projected from said second lateral surface of said header tube; and when said grate is in said second position, said end of said grate is positioned generally between a straight-line projected from said first lateral surface of said header tube and a straight-line projected from said second lateral surface of said header tube.

17. The dredge head of claim **16** wherein when said grate is in said second position, said end of said grate is positioned generally between a straight-line projected from said first lateral surface of said header tube and a straight-line projected from said second lateral surface of said header tube and proximate said first lateral surface of said header tube.

18. A dredging system comprising said dredge head of claim **16**.

19. A dredge head comprising:

a) a blade having a reverse C-shaped, arcuate cross-sectional profile with a longitudinal central axis which extends lengthwise through said profile, said blade having a forward facing surface, a rearward facing surface, and a thickness therebetween, said blade having a blade opening and a channel opening both of which extend through said thickness, and said channel opening being positioned adjacent to said blade opening;

b) a header tube attached to said blade and having a forward facing end, a rearward facing end, and an aperture which extends axially therethrough said forward facing end being located proximate said blade and said rearward facing end being distal said blade, said blade interfacing with said rearward facing surface of said blade, and said aperture being coaxially aligned with said blade opening and being positioned adjacent to said channel opening;

c) a grate extending completely across and beyond said blade opening, said grate having an upper grate prong spaced apart from a lower grate prong and defining an elongate slot therebetween, said grate being pivotably movable between a first position and a second position, and when said grate is in first position, said upper grate prong, said lower grate prong and said elongated slot extends across and beyond said blade opening and said upper and lower grate prongs contact said forward facing surface of said blade and partially limits flow through said blade opening, and when grate is in said second position, said upper grate prong, said lower grate prong and said elongated slot are aligned at an angle to said blade opening and said upper and lower grate prongs are less restrictive in limiting flow through said blade opening and said grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 50 degrees of pivoting travel;

d) an articulatable member pivotably secured to said header tube and being operably connected to said grate, said articulatable member being movable between a first position which corresponds to said first position of said grate and a second position which corresponds to said second position of said grate, and said articulatable member having a handle integrally formed with said grate and being offset at an angle therefrom by a first arcuate transition portion; and

e) a thumb tab secured to said rearward facing surface of said blade and spaced apart from said header tube, said thumb tab configured to enable a user of said dredge head to grasp and manipulate said dredge head.

20. The dredge head of claim **19** wherein said grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 60 degrees of pivoting travel.

21. The dredge head of claim **19** wherein said grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 70 degrees of pivoting travel.

22. The dredge head of claim **19** wherein said grate is pivotable about an axis of pivotation and along an angle of pivotation having a magnitude of greater than about 80 degrees of pivoting travel.

23. The dredge head of claim **19** wherein said dredge head is constructed from non-metallic material and said header tube is void of any obstructions.

24. The dredge head of claim **20** wherein said dredge head is constructed from plastic.

25. The dredge head of claim **19** wherein said a plurality of said thumb tabs are secured to said rearward facing surface of said blade and said plurality of thumb tans are spaced apart from one another.

26. The dredge head of claim **19** wherein said blade opening and said channel opening are aligned parallel to one another, and said articulatable member passes through said channel opening.

27. A dredging system comprising said dredge head of claim **19**.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,552,551 B2
APPLICATION NO. : 11/302354
DATED : June 30, 2009
INVENTOR(S) : Richard J. Kohutko

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

IN THE BACKGROUND:
In Column 1, Line 20, delete “the” after “into”.

IN THE SUMMERY:
In Column 4, Line 14, add a comma after “facing surface”.

In Column 4, Line 18, remove the period after “extends”.

In Column 4, Line 42, add a comma after “facing surface”.

IN THE DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS:
In Column 11, Line 1, remove the “s” after “bolt heads” and add a comma.
[i.e., it should read, “184 is a bolt with a bolt head, a bolt shaft,...”]

In Column 11, Line 24, delete “20” and add “200”.

In Column 13, Line 29, add a period after “217”.

In Column 14, Line 23, add a period after “217”.

In Column 17, Line 33, add a comma after “first”
[i.e., it should read, “...generally defines first, second and...”]

In Column 17, Line 42, add quotations after “OA”.

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INVENTOR(S) : Richard J. Kohutko

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

IN THE CLAIMS:
In Claim 25, Line 5, delete the word "tans" and replace with "tabs".

Signed and Sealed this

Third Day of November, 2009

David J. Kappos
Director of the United States Patent and Trademark Office

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IN THE CLAIMS:
In Claim 25, Line 5, delete the word "tans" and replace with "tabs".

This certificate supersedes the Certificate of Correction issued November 3, 2009.

Signed and Sealed this

Twenty-fourth Day of November, 2009

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office